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On the farm front

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FARM ADVISORY AND EXTENSION SERVICES

DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

Cover Page Picture :

Mexican dwarf Wheats are becoming more popular in the State

DIRECTOR'S PAGE

Agricultural Extension in Japan:

In India community development approach was accepted on the basis of the recommendations of the Grow More Food Enquiry Committe. The basic idea behind such an approach was to remove povertv, disease and ignorance from rural India by activising people to produce more food and other agricultural commodities. In other words it was meant that we should rapidly improve the techniques of production and transform subsistence agriculture into progressive agriculture which is more productive. Unfortunately the community development programme has not produced the desired objectives. Even Shri S.K. Dey, the author of this movement, has admitted the fact. The bulk of the rural people still continue to live in poverty. The agricultural extension service as we see to-day is more benefiting to influential and bigger landlords. The small and landless labourers have by and large not received any benefits from such a service.

Against this background, it would be of interest to know what type of machinery exists in a country like Japan which also faces no less problems both with regard to availability of land and resources, to carry out extension work. Agricultural extension service has been a great success in Japan. It is worthwhile to note its salient features.

Prefecture :

Prefectural Governments are autonomous bodies. The National Government provides service personnel (subject matter specialists) to the prefectural Government as they need. Extension workers are officers of the prefectural Government. They consists of a Home adviser, Extension adviser and subject matter specialists. Each prefectural Government decides the number of subject matter specialist it needs. Their number and requirements vary from prefecture to prefecture. (We in India appointed extension staff in the block in a uniform pattern than justified by economic and

social factors). The centre plays an important role in training and guiding the extension workers of the prefectural governments. The ministry of Agriculture and Forestry has 7 regional administration branches in the country with the agricultural extension division for this Purpose.

Agricultural Extension Office:

Extension Offices have been established in each prefecture at the rate of one office for two rural communities. By 1970 there were as many as 630 extension offices all over Japan. Each extension office covers nearly 10,000 farm households and 9,000 hectares. Nearly 21 farm advisers are working in each office (17 agricultural advisers and 4 home advisers). Agricultural advisers are : i) Vegetable Specialist, ii) Fruit Specialist, iii) Cash crop, specialist iv) Flower Specialist, v) Grass land Specialist, vi) Poultry Specialist, vii) Live stock Specialist, viii) Animal hygiene Specialist, ix) Farm management Specialist, x) Training officer etc.

(The number of specialists to be included varies in each prefecture.) Each extension office is equipped with audio visual equipment, mobile vehicles like cars, motor cycles and scooters. Each office is also provided with crop and soil analysing equipment.

Agricultural Experiment Stations:

There are 360 agricultural experiment stations of the Central Government spread all over the country. Besides, each prefecture also has its own experimental stations which carry out applied research and help the farmers, in tackling their day to day problems.

Prefectural Govt.

Pre. Agril-improvement Production council | Director of Agril. Dept. | Pre. Agril. Res. Council

Pre. Agril-improvement Production council → Dist. Agril. Improvement council → Rural Agricultural Co-operatives

Director of Agril. Dept. → Extn. division Chief → Subject matter Specialists
i) Rural youth
ii) Home improvement sect.
iii) Extension Section.

Pre. Agril. Res. Council → Agril.Res. Station → with specialists
crop
Horticulture
Livestock

Extension Office

Chief

- Agricultural
  - Incharge of techniques
  - Incharge of area
- Home
  - Wide area Adviser
  - Narrow area Adviser

Agricultural Co-operative at village level :

These are multipurpose cooperatives. They also employ on their staff agricultural experts and home life improvement staff.

Working of extension programmes :

Governor of the prefecture decides the size of the farm production plan, marketing and the type of farming to be carried out in the prefecture. In the planning process the number of viable farms, nature and quantum of help to be given to farmers, targets for land consolid ation and development, construction of new roads, marketing facilities, construction of live stock barns, production and import size of cattle feed etc., are decided in consultation with the Agricultural improvement promotion council on which are represented the farmers and rural youth. Nearly one year is utilised for planning. Once the plan is approved, it is straight away given to the staff for implementation in phases over a period of 3 years. The number of villages to be covered in each year is decided in the beginning only. As a result of such a methodology in planning where farmers fully participate, farm production is more and more being specialised, cultivation of single varieties, adoption of plant protection measures in uniform areas, have now been possible. Joint farm operations have also been presently possible on account of farmers' acceptance of the production plans.

* * *

Food production target - Rabi/Summer :

The rabi and summer production programmes drawn up for the State, according to the reports received so far, are expected to be fully achieved, thanks to the favourable weather situation as also the keenness of the farmers to make best use of the available resources to produce more. The target of 1.6 million tonnes of foodgrain production envisaged for the

season does not, however, represent a marked increased over the normal production which is around 1.5 million tonnes. All the same, if this production is fully achieved, the State this year would be producing close to 6.5 million tonnes of foodgrains which would represent an increase of 4 lakh tonnes over the normal production. This is a phenomenal achievement considering the constraints in the way of agricultural production being faced all over the country in the wake of the acute shortage of chemical fertilizers.

Annual plan for 1974-75 :

With 1973–74 expected to end on a happy note, the State would naturally have to take a bigger production target next year despite the continuing fertiliser shortage. All the districts should therefore draw up the annual plans for 1974–75 not only in respect of foodgrain production but also in respect of all other crops and programmes. The problems encounted during 1973-74 should be gone in depth to plan effective measures to tackle them during the ensuing year.

Greater emphasis on compost production and green manuring :

The time has come to take a hard look at the resources position and to devise new and innovative methods to tackle the various problems especially with regard to fertilizers. Greater stress will have to be laid on scientific methods of preparing compost manures and to augment the supplies of green manure by mounting up a campaign to grow more of green manure crops. This is a very important task which the Extension Staff have to take up seriously in the coming years.

Production of hybrid seeds should also receive greater attention as the demand is bound to increase appreciably.

Demonstration results :

Data on demonstrations conducted during kharif and rabi seasons should be collected, analysed and reports submitted to the department before end of February, 1974.

Dr. H. L. Kulkarny
Director of Agriculture

II How the previous month was

(Seasonal and crop conditions during december 1973)

Weather was mainly cloudy and chilly in many districts during the early part of the month. A few spells of showers were received in some districts of the State. This sudden change in weather and untimely showers came in the way of harvesting and threshing of kharif crops. Thereafter weather continued to be bright and moderately chilly. Harvesting and threshing of kharif crops, prepartion and raising of nurseries for summer paddy crop were carried out. The agricultural situation in brief is given below for each division.

Bangalore Division:

Weather was bright and chilly except for a few showers in the early part of the month. Harvesting of ragi and groundnut, sowing of hybrid maize, pulses, picking of cotton, chillies, raising of paddy nurseries and fall ploughing were the major agricultural operations carried out. Stemborer on hybrid maize, pod borers on avare and tur, jassids and bollworms on cotton and mealy bugs on sugarcane were noticed. Necessary plant protection measures were taken up.

Mysore Division:

Weather was cloudy and chilly in the early part of the month, thereafter it continued to be bright with sunny days. Agricultural operations carried out were, harvesting and threshing of paddy and ragi, earthing up of sugarcane, preparatory cultivation for raising paddy nurseries, top dressing of wheat and rabi jowar. There were no reports of incidence of serious pests and diseases.

Belgaum Division:

Cloudy weather prevailed. Sowing of hybrid bajra, hybrid maize, wheat, pulses and planting of sugarcane, top dressing and intercultivation of rabi jowar, harvesting of spreading variety of groundnut and fall ploughing were some of important agricultural operations carried out. Boll worms on cotton, aphids on beedi tobacco, earhead pests on rabi jowar were observed and necessary control measures were taken up.

Gulbarga Division:

Weather was mainly cloudy and dry in Gulbarga, Raichur, and Bidar districts where as a few passings showers were received in Bellary district. Topdressing and intercultivation of wheat and of rabi jowar, harvesting of paddy and groundnut, preparation of land for summer sowing and picking of cotton were the major agricultural operations carried out. Boll worms on cotton, earhead bugs on rabi jowar, mites on wheat, pod bores on bengal gram, tur and avare were noticed. Necessary plant protection measures were taken up.

III INPUTS FOR FARMERS :

a) Seeds :

Hybrid seed production programme for summer 1974:

The National Seeds corporation has allotted foundation seeds to the Department for organising seed production during this summer season. An area of 2672 acres under C.S.H-variety of hybrid jowar, 800 acres and 350 acres under Deccan and Ganga-5, respectively of hybrid maize, and 600 acres under hybrid bajra will be taken up for seed production.

The seed production will be taken up through the seed growers and seed processing units of cooperative and private sectors. The responsibility of seed procurement rests with the Agro seeds corporation and Karnataka Seeds Marketing Co-operative Federation. The farmers and the processing units have to enter into agreement with the above institutions before the foundation seeds are allotted to them. Foundation seeds to processing units will be issued directly by the processing agencies. The foundation seeds to the farmeas will be allotted through District-allotment committees specially formed for this purpose. The District Deputy Directors of Agriculture are requested to see that seed production work is taken up by only one agency in the concerned Districts to avoid duplication of work. Besides this programme, the National seeds corporation have also taken up seed production programme. They have entrusted the seed production work to farmers under National seed growers programme and producers programme. The list of such farmers coming under this programme will be sent to the Deputy Directors of Ariculture separately. The Deputy Directors of Agriculture to whom the seed production programme is entrusted are therefore requested to see that this programme is taken up by only one agency in the concerned Districts to avoid duplication of work and implemented sucessfully and efficiently.

The non availability of required quantity of foundation seeds from the N.S.C during the previous season (kharif 73) and the lack of supervision and follow up action be the extension staff, had resulted in larger number of seed plots being rejected for certification. Some farmers and traders have misused this position by selling the seed at exhorbitant price ignoring the terms and conditions agreed upon by them while taking up seed production.

It is therefore impressed upon on all the Districts Deputy Directors of Agriculture to mobilise all extension staff under their control and available resources at their command for the successful implementation of the seed production programme during 1974 summer season so that adequate quantities of quality of seeds are produced for sowing during 74 kharff season.

IV ARTICLES CONTRIBUTED BY THE DEPARTMENTAL OFFICERS

I) Farm ponds for black cotton soils of Bellary Dist.

By P. Bhimaiah, Agricultural Officer, (Soil Conservation), Bellary

Bellary District with semi arid climate receives scanty and erratic annual rainfall, on an average of 500 mm. The effect of this scanty rainfall is further reduced due to prevailing high temperatures and high velocity of winds and low permeable and ill surface drained black cotton soils, thus causing serious hazards of erosion - rills and gullies. The gullies of small to medium sizes (3'- 5') are normally seen on cultivated fields.

Apart from shortage of water for crop production, there is shortage of water for human and for live stock consumption. The water which is found only in deeper depths is saline and not fit for human consumption or for crop production. The rainfall received in a few heavy precipitations and the low intake capacity of the black cotton soils results in heavy surface run off causing rills and gullies in the soil. This can be largely controlled by harvesting either by (1) Farm ponds fed by surface run-off through a gully or by (2) Off-stream farm ponds.

These Farm ponds serve dual purpose of checking rill and gully erosion and harvesting water for human consumption and for crop production by giving protective irrigation to dry land crops. The old farm ponds are existing in patches in Bellary taluk in tracts of black cotton soils. They are locally called 'vakrani'.

The Farm ponds can be excavated by human labour or by Bulldozers which may cost Rs. 4000/- depending upon its dimensions to be adopted. The details of standard farm pond (constructed at the soil conservation research farm, Siddargadda, Bellary district.) is stated below:

1 Top width : 30m x 30m

2 Bottom width : 16.8m x 16.8m

3 Maximum depth of storage : 4.925 Metres.

4 Storage capacity: 0.28 Ha.metres

5 Catchment area : 16.20 Hectares

6 Cost of construction : Rs. 4,800/-

The pond is located on existing gully carrying run-off waters from a catchment area under agriculture crops with an average slope of 1-1.5%. From this catchment area on an

average of 10% of the total rainfall is being harvested which amounts to gross yield of 0.50 Ha. metres for every 10 Hectares of catchment or one Ha. metre for every 20 Hectares.

The water harvested in the farm pond can be best utilised by giving protective irrigation for kharif crops and or for rabi crops to supplement the rains for assured and increased crop production. The storage capacity of 0.28 Ha. metres can be utilised for protective irrigation at 5 cms./Ha. Such two protective irrigation can be given to an area of 10 hectares of crops like Jowar, Cotton, Sateria etc., by utilising 0.100 Ha. metres of water from the pond and balance of 0.180 Ha. metres can be utilised for cattle consumption etc., and allowance for loses in storage. The common losses are due to evaporation and is negligible due to presence of soft impermeable sub-soil (Murram). Maximum evaporation occurs during March to June. To get the maximum benefit, water can be used for irrigation during the months from June to January by growing short duration crops under light protective irrigation. During the end of May or beginging of June one or two run-off causing rains are received and enough water can be collected. Again in September–October when heavy showers are received the ponds get filled up.

2) Quality of Irrigation Water

R. S. Gajendragad, D.D.A., (Land Reclamatian), Bangalore

I Function of Water:

Water is an essential item for life. Human beings as well as plants need water for their existence. Domestic water supplies are of first importance and next importance in uses of water, are the uses of water for irrigation and for industrial purposes. Proper quality of water is essential for satisfactory domestic use and irrigation.

The most obvious function of water under irrigation is to satisfy water requirements of crops. Water constitutes nearly 70-80% by weight of the plant body. Water is also required in large quantities to meet transpiration losses.

The less obvious but equally important function of water is to leach away unwanted salts from the root zone of crops. Irrigation leads to increase in salt content of soil. That is as the water is last by evaporation, transpiration, etc., the dissolved salts are left behind in the soil. It is estimated this concentration factor varies from 2 to 10. Unless the salts thus concentrated are leached away by subsequent irrigation, farming would have been impossible. Even with the better quality of water, about 10% of water is utilised solely for leaching. As the quality of water detereorates a greater percentage of it is rendered unproductive.

Water in nature is never pure H_2O. It always contains impurities dissolved. Therefore, the dissolved salts though minute in quantity have their effects on soil and plant profoundly. As a rule, the dissolved salts are harmful to plants. But it may be noted that irrigation water also supplies sufficient quantities of Ca, Ma, Na, K.B. The exact amounts of supplied elements depends upon the composition of water (quality) and the quantity of water applied.

Class of water m.mhos/cm.	Leaching requirment for indicated maximum drainage 4 m.mhos/cm.	Value of conductivity of water at bottom of roots 8	12	16
150	2.5%	1.2%	0.8	0.6
375	6.2	3.1	7.1	1.6
1125	18.8	9.4	6.2	4.7
3325	56.2	28.2	18.8	14.1
7500	—	62.5	41.7	28.2

Composition of water or quality of water :

The composition of water is known as quality of water. It is highly variable. Rain, as it falls is the purest form of water. Even so, it contains dissolved gasses and salts. (Max. upto 5 P.P.M.) As the rain runs off the ground it picks up inpurities dissolved and suspended which are determined by the salt content and erodibility of the catchment. As the soils of arid (dry) regions generally contain more salts, it is evident that rivers flowing through such regions are loaded with more salts than the rivers of humid region. For instance, let us compare the composition of Hagari river which flows in the red soil and black soil area. It is observed that its water is good as long as it flows in red soil area (Phairantiyappa Project) but as it flows through black soil its water becomes highly saline and not fit for irrigation.

The composition of underground water is hightly unpredictable. Wells separated by as lit le as 100' analyse differently. In general, salt content of underground water is higher than surface flow.

Hence it will be wise policy to get water tested before an irrigation project or farming is contemplated. Monthly tests are essential. But if it is not possible water should be tested at least seasonal. The composition of water is expressed conventionally as

i) Milli equivalents per litre (m.e/l)
ii) Parts per million (P.P.M.)
iii) Parts per lakh (P.P. lakh)

The relation between them is as follows :

1 m.e./l=2 P.P.M.=2 P.P. lakh.

The quantity of salt added through irrigation depends upon composition of water and quantity of water.

Example : T.S.S. in water =20 P.P.M.

30 inches of water is used for irrigation.

In one acre inch

$$=\frac{4840 \times 9 \times 62.5}{12}=2.269\times10^5 \text{ lbs/acre}$$

therefore 30 acre inch

$$=30 \times 2.269 \times 10^5 \text{ lbs of water}$$

at 20 P.P.M.

$$=\frac{30 \times 2.269 \times 10^5 \times 20}{10^6}=136.2 \text{ lbs/b/Ca}$$

OR

1 Hect. Cm.

$$=(100 \times 100)^2 \times 1=10^8=10^5 \text{ kg/ha.}$$

At 20 P.P.M.

$$=\frac{10^5 \times 20}{10^6}=2 \text{ kg. per Hect.}$$

Quality of water :

The quality of irrigation water is judged by the following characteristics:

1. Total salt content.
2. Relative portion of sodium to other cations.
3. Concentration of certain specific elements.
4. Residual carbonates.

It is to be noted that the above characteristics are not mutually exclusive. That is a good quality water for irrigation must simultaneously satisfy the creteria for all the four characteristics. For example water may be very low in salt content, it may be

unfit for irrigation because of high Na Ca ratio or high B–content or high residual carbonates.

Total Salt Content :

The plants take water from soil water by osmotic phenomenon. It is well-known that water moves from dilute to concentrated solutions. That is, if salt concentration increases in water, the plants find it difficult to draw their water requirements. Experiments have indicated that at osmotic pressure of 15–20 atmospheres plants wilt permanently.

Secondly, same concentration of different salts produce different osmotic pressure depending upon its number of ions :

For instance	Osmotic pressure
0.1% Na_2So_4%	0.470 atm.
0.1 Na Cl%	0.766 ,,
0.1 Ca Cl_2%	0.605 ,,
0.1 Ca So_4	0.329 ,,

The common experience that Chlorides are more toxic than Sulphates compared on equal weight basis, is really due to difference in osmotic pressure.

The premature opening of bolls in cotton develops where abnormal amounts of soluble Cl_2 So_4 and HCo_3 of Na occur in soil or where Na–clay is in sub-soil is attributed to the disturbance in osmotic relations of cotton plant resulting in physiological drought at the fruiting stage.

Some standards have been established by workers of United States Salinity Laboratory in terms of conductivity of water in micromhos/Cm at 25c.

Osamotic pressure	m.e/l	Conductivity in irrigation water micromhos/Cm at 25°c.	
in above	2–5	250	Normal or low Salinity C_1
0.1-0.0	2.5–7.50	250-750	Satisfactory or medium Salinity C_2
0.3-0.8	7.5-22.50	751-2250	High salinity C_3
70.8	7.2-25.0	2250	Very high salinity C_4

This upper limit C_4 of T.S.S. percentage has been modified by Durand (1955), Kanwar(1961) into C_4 from 2251 to 2500 C_5 from 500 to 20,000 micromhos/Cm. Recently Rammoorthy (1964) has further modified the United States Salinity laboratory C_4 class into C_4 from 2251 to 6750 and C_5 from 6751 to 20250 micromhos/Cm. keeping the dependence of suitability of irrigation water.

Crops do not behave alike in combined effect of salt and temperature. However, toxicity due to given salt increases with the temperature. Higher the temperature, lower is the yield at any given salt concentration. It has been found that germination of of seeds at a given salt concentration was markedly affected by temperature.

At 700 P.P.M. the results obtained were as follows:

Temperature	Germination
55° F	89.5%
70° F	85.0
90° F	20.0

Further, Kanwar and Rammoorthy, have emphasised on the nature of plant spicies and texture of the soil in evaluating the quality of water for irrigation. Since it has been observed that wheat, grew quite satisfactorily with irrigation water upto a conductivity value of 9000 micromhos/Cm and SAR of 35.35 and barly upto aconductivity value of 17500 micromhos/Cm. and SAR of 20.16 in sandy and sandy loamy soils of Bhilwara, Pali, Jadhpur. It has been also observed that appreciable amount of No^3 in irrigation water and relatively higher fertility level seem responsible for the safe utilisation of such highly saline-alkali water. Hence, it may be said that by maintaining Na-Ca and Mg. and Ca, Mg. ratio will be helpful in the better utilisation of saline water on course textured soils. Secondly, if the salts present are largely So_4, the values of salt content in each class can be raised by 50%.

II Relative proportion of Sodium to other Cations :

The soluble inorganic constituents of irrigation water react with soils as ions rather than as molecules. The principal cations are Ca^{++}, Mg^{++} and Na^+ with small quantities of K^+ present. The principal anions are Co_3 and HCO_3, So_4 and Cl with Flurides and Nitrates occuring low concentrations. These ions exchange places with the absorbed ions in the soil. A high proportion of Na^+ in the irrigation water will tend to cause high sodium in exchangeable complex resulting in alkali soil. So, the alkali hazard involved in the use of irrigation water is determined by the absolute and relative concentration of cations. If the proportion of sodium is high, the alkali hazard is high and if Ca and Mg. predominate, the hazard is low. It has been said that Hard water makes soft land and soft water makes hard land".

III Concentration of Certain Specific Elements :

There are some elements whose content in water is so minute that they do not affect salt content. Yet, because of toxic effects, they deserve special consideration. Boron and Lithium are toxic to plants. Boron is of more common occurance than Lithium. In general, sub-surface water is richer in Boron than surface water. Some well waters in Bellary district analyse as high as 3 to 5 p.p.m. The class of water as defined by boron content depends on the crop itself.

	Boron Tolerance	
	1 P.P.M.	2 P.P.M.
	Potato	Onion
	Cotton	Alfa
Crops	Tomato	Turnip
		Carrot
	Wheat	Broadbeans
	Corn	Sugarbeats

However, the following limits of boron content in irrigation water is followed.

Limits of Boron in P.P.M.

Class	Sensitive crops	Semi tolerant	Tolerant crops
1	0.33	0.67	1.00
2	0.33-0.67	0.67-1.33	1.00-2.00
3	0.67-1.00	1.33-2.00	2.00-3.00
4	1.00-1.25	2.00-2.50	3.00-3.75
5	1.25	2.50	3.75

Even a fraction of a part per million of Lithium in irrigation water produces tip and marginal burning and defoliation of citrus leaves.

IV Residual Carbonates :

When sum of carbonates and bi-carbonates is in excess of Ca and Mg, there will be deactivation of Ca and Mg, leaving residual sodium carbonates. Since $Na_2 Co_3$ can bring almost complete precipitation of Ca and Mg, it is much more harmful than Na Cl or Na_2So_4 of equivalent concentration. On the basis of data available, using residual sodium carbonate, it is concluded that water with more than 25m.e/l residual sodium carbonate are not suitable for irrigation purposes.

The following limits of residual carbonates has been used for classification of irrigation water.

Class	Limits of residual Carbonates	Remarks
I	6–1.25 me./l	safe
II	1.25-2.5 me./l	marginal
III	-2.5 me./l	not suitable

Disused wells :

Wells long ago abandoned are some times revived for irrigation. Analysis of the stagnant water gives misleading picture of high salinity, high boron etc. To arrive at a correct interpretation, it is better to bale out the water and follow the changes in composition of water.

Low-salt, High Na-water :

The unfavourable Na, Ca ratio can be corrected by adding Gypsum to either to soil or more usually to the irrigation water.

High salt :

The process of desalinisation of water is too expensive and uneconomic for irrigation.

V GLEANINGS FROM OTHER JOURNALS

I) Potash up-take and nitrogen supply

Potassium is a nutrient which regularises the utilisation of nitrogen by the plant. When both nutrients are freely available they are taken up by the plant in specific proportions. There is a demonstrable relationship between nitrogen and potassium uptake, as shown by the following experimental results with wheat:

The dependence of potassium up take on nitrogen nutrition. supply in milli equivalents.

Content in milli equivalent per cent

Treatment	Nitrogen		Potash	
	Supply	Content	Supply	Content
N_1K_4	1.00	92	2.55	59
N_2K_4	1.49	117	2.55	68
N_3K_4	1.95	155	2.55	87
N_4K_4	2.55	222	2.55	105

With increasing nitrogen supply from N_1K_4 to N_4K_4, nitrogen content increases from 92 to 222 milliequivalents. Potassium supply was constant at 2.55 milliequivalents for all levels of nitrogen but in spite of this, the uptake of this nutrient varied greatly from 59 milli equivalents percent at N_1K_4 to 10^5 N_4K_4 Thus, in all cases the plant takes up only so much potassium as it requires for the utilisation of nitrogen. When nitrogen supply is low as at N_1K_4, nitrogen content is also low and only the necessary amount of potash is taken up although supply of potash is high. With increase in nitrogen supply, nitrogen content increases and accordingly so does potash up-take.

The dependence of potash up-take on that of nitrogen is an important point in practical manuring. It follows from this that potash must be available in the soil in sufficient quantity to ensure the full utilisation in yield formation of the nitrogen supplied. The factors which determine the rate of potash fertilisation are the requirement as shown by soil analysis and potash removal by the plant.

Source: International Fertiliser Correspondent, Vol. XIV No. 3, 1973

2) Genetic improvement and production potential of kharif pulses

Pulses occupy nearly 18% of the total area under foodgrains in India but their proportionate production is much less than that of the cereals. This is largely because pulse crops give considerably lower yields. Attempts have been made in recent years at a number of research centres in the country to evolve high yielding varieties of pulses. As a result of these studies, a number of improved varieties of pulses, particularly of the kharif types, have now become available, which offer considerable scope for increasing the production of these protein rich food grains.

The work on the genetic improvement of pulses in India can be divided into two distinct phases. The first phase starting in an earlier part of the century ended about a decade ago, and this period was marked by exploitation of local genetic variability from within the country. This work has been valuable as it has provided a basis for more significant advances in the future. The second phase started in the mid sixties with the setting up of the All India coordinated Research project on pulses by the ICAR. This work is still in its early stages but a number of improved varieties have already been released. Some of the more important advances made in the course of this work are summarised below:

A major development has been the use of new concepts in the breeding of the different pulse crops. Thus, it has been found that a reconstruction of plant-type can be as rewarding in the case of pulses as in wheat and rice. Following this realisation, plant breeders have attempted to evolve pulse varieties characterised by a high harvest index, shorter maturity duration and capacity to respond to increased plant populations per unit of land.

With the application of these concepts, improved varieties, particularly of arhar, moong, lobia and massor have since been developed. Some of these varieties have been multiplied by the National Seeds Corporation and distributed to the farmers. Perhaps the most useful feature of the new varieties is that they show a very short maturity duration and lend themselves to multiple and inter-cropping. The yield of some of the new varieties is far higher than that of the older types. The more important of these improved varieties are given in Table-I

TABLE–I

Some of the newly evolved or tested* varieties of pulses.

Varieties	Yield (q./ha)	Maturity in days.
Chickpea		
C–35	31.5	125
Early S–3	29.3	115
BGS–1	25.9	120
Pigeon Pea		
S–103	15.00	275
Pusa Ageti	27.00	150
Sharda	25.00	160
Mukta	25.00	170
T–21	20.00	154
Green gram		
Pusa Baisakhi	10.00	65
Jawahar–45	10.00	80
S–8	12.00	60
PS–7	12.00	60
G–65	10.00	65
Black gram		
Pusa–1	15.00	84
H–10	12.50	95
G-1	15.00	94
Cowpea		
C–152	25.00	88
C–20	18.00	85
Lentil		
Pusa 1-1	20.00	80
Pusa–6	22.00	90

* These varieties have been evolved at a number of research centres including the Agricultural Universities. The yields are based on the results of the co-ordinated trials at different centres and agronomic studies at IARI.

The New Strategy:

There has been a general cancern in the country, in the wake of what has been described as a green revolution, that some of the important crop plants like the pulses have not shown any significant increase in their production over a number of years. In fact, there has been some decline in the production of pulses during the last five years, largely because of diversion of land to the high yielding varieteis of wheat. This awareness of the importance of increasing the production of pulses both by farmers as well as the agricultural administrators should be welcomed. The farm scientists are conscious of the fact that the technology for production of pulses can be greately improved and this aspect should continue to receive major attention. This technology is certainly not as good as that in the case of some of the important cereal crops like wheat. It would be surprising, if it were so.

The pulse crops over the last so many centuries have been grown in our dry lands under conditions of low soil fertility and an extremely poor management. Under these conditions, it is to be expected that most of the genotypes, which could take advantage of the more favourable factors of crop growth like fertilizer and irrigation have been eliminated through the process of natural selection. Their place has been taken by varieties, which have the capacity to survive and establish under adverse conditions regardless of high yields. It should take some time before plant breeders are able to generate the wealth of genetic variability, which can give high yielding

varieties similar to those in wheat. The assembling of such variability from different parts of the world is perhaps the most urgent task, which receives our attention.

It would, however, be a great mistake, if we were to believe that a major advance in the production of pulses is not possible without the availability of high yielding varieties of the type released in wheat. The development of the high yielding varieties is a continuous process and they would make a most important contribution in increasing the production of pulses. It is equally important, however, that we began to exploit fully the genetic potential which has already been created in these crops. Even in the case of wheat, we are exploiting at present no more than one-fourth of the genetic potential of the high yeilding varieties. The situation in pulses is not very different, although the potential in in this case has not reached the same level.

An important lesson to be derived from the research work on pulses, more particularly the work during the last six years, is that production technology is available which can provide basis for achieving significant advance in the production of these crops. Two of the major components of this technology are described below.

1. Package of practices :

Based on research work during the last six years, it is possible to suggest a package of practices, involving use of chemical fertilisers, pesticides and certified seed, for increasing the yields of the pulse crops. Thus, it has been found that a good response in terms of economic returns can be obtained in most of the pulse crops, following the use of pesticides. The pesticides in the case of pulse crop may have almost the same role of chemical fertilizers in the case of high yielding varieties of wheat and other cereals. These crops are far more susceptible to insect damage than the cereals, and while development of resistant varieties should continue to receive attention, it would be unrealistic and unwise to believe that the problem can be solved by the resistant varieties alone. The use of pesticides has to become an integral part of crop management practices in the case of crops like pulses and oilseeds. There is an obvious need for bold policy decisions in this regard. An imaginative programme of using pesticides in the case of pulse crops can make a significant contribution in increasing the production of these crops. The improved package of practices should also provide for the use of fertilisers, more particularly phosphorus, to which most of the pulse crops show good response. The scientific data, which provide the basis for such an improved package of practices, has been described in a recent publication* (* New Vistas in Pulse production. pub. IARI, 1972) of IARI and in the proceedings of the Co - ordinated Pulse Improvement Project.

2 Multiple and inter-cropping :

Pulses, as explained earlier, have fitted in the past in the extensive kind of agriculture. With the availability of short duration varieties, these can be brought under intensive cultivation in several parts of the country, where conditions for crop growth are more favourable. This can be done by fitting the pulse crops in multiple cropping patterns, so that farmers with assured irrigation and other facilities can take three or four crops from their land over a one-year period. The new varieties of pulses can form a particularly useful component of such multiple cropping patterns.

The short-duration varieties of of moong, cowpea, and urd are equally suitable for intercropping with such long-duration crops as sugarcane, cotton and arhar. Recent research work has shown that inter-cropping of moong with sugarcane, cotton and arhar can be highly profitable practice and can help to increase the production of this important pulse to a very great extent. The possibilities, which exist in this regard, can be seen from the fact that millions of hectares of land are, at present, cultivated in different parts of the country with sugarcane and cotton. The inter-cropping of moong in these crops can become one of the easiest and effective means of increasing production of important pulse crops.

Source : Indian Farmers, Digest, Vol. 6, No. 7, July, 1973

3) Centrally Sponsored Scheme for Foliar Application of Urea on Cotton.

Amongst the key factors for augmenting the yield level of crops, application of fertilisers, especially nitrogen, is undoubtedly one of the most important. The conventional mode of fertiliser application to crops is through soil, either by placement or as broadcast and as basal or top dressing. Although this method is quite convenient and has been traditionally in use, it has the disadvantage that part of the nutrients may get locked in the soil or may leach down beyond the range of roots without being readily available to the plant. Further, timely application is sometimes rendered difficult, due to the total absence of rains in the case of the unirrigated crop. Foliar feeding of fertilisers as an alternative method was, therefore, thought of.

In the context of the present urgency for maximising production, it was felt that every available technique contributing to increased production should be taken advantage of. Accordingly, attention came to be focussed on foliar

application of urea, which enables the economic use of fertilizer and was reported to give more yield of seed cotton per unit quantity of nitrogen, as compared to its soil application.

As it was a new technique with which the farmers were not familiar, a Centrally sponsored scheme for laying down large scale demonstrations to popularise foliar application of urea and at the same time study its efficacy under large scale field conditions, was sanctioned by the Government of India in the year 1969–70. The scheme has been in operation in the States of Punjab, Haryana, Uttar Pradesh, Rajasthan, Madhya Pradesh, Gujarat, Maharashtra, Andhra Pradesh, Tamil, Nadu and Mysore. Under this scheme, cent per cent cost of urea and 50% cost of power sprayers required for foliar application, is being met by the Govt. of India. The demonstrations were organised on farmers' holding in selected centres representing the major cotton growing tracts. The size of each demonstration plot was generally about two hectares. However, in some cases, smaller plots of one hectare or less were also laid out in tracts where the average size of holding was small. The demonstrations were conducted on both irrigated and rainfed cottons. The dose of urea applied per hectare was 60 kg. (27 kg. N) in three instalments. In the case of irrigated crop, this was in addition to the basal dose of 20 to 30 kg N per hectare normally applied by the farmer himself by the conventional method. In the case of rainfed crop, the dose given through foliage was usually the only source of chemical fertilizer.

This method enables the farmer to prune his fertilizer bill as he can expect to obtain the same response in yield with lesser quantum of fertilizer compared to that required for soil application. This advantage is particularly relevant in the present context, when the fertilizer supply position in the country is not very satisfactory. Any economy which can be effected in its utilisation, without sacrificing the efficiency in crop production, is to be welcomed and encouraged.

Another advantage is that fertilizer and pesticide application can be combined in one operation, thereby reducing the operation costs which in turn results in lowering the overall production cost per kg of seed cotton. This would also indirectly promote the adoption of plant protection measures in areas where this practice has not yet become as popular as fertilizer application. Further, by combined application of fertilizer and pesticide, there is greater guarantee of getting additional yield by the farmer than would be the case, if these inputs are applied singly.

Foliar application is especially advantageous in the case of rain-grown cotton because soil application of fertiliser as such is sometimes risky and often difficult to adopt in time, due to the unpredictability of rainfall. Moreover, the dry land farmer are reluctant to apply fertilizer to cotton at the time of sowing, which is the optimum period

for its application, in view of the uncertainty of the crop itself. This problem can be solved by resorting to foliar application when the crop has grown to a certain height.

Although detailed experimentation is necessary to fix up the optimum dose and time for foliar application of urea in the case different varieties, it can be generally stated that the best period of application is when the plants enter the flowering phase. For rainfed cottons, the optimum dose would be about 25 to 30 kg nitrogen per hectare (55 to 70 kg. of urea) to be applied in two or three equal doses –the first just before the plants begin to produce squares and the subsequent ones at 12–20 day intervals. Under irrigated conditions, higher doses of 30 to 60 kg nitrogen per hectare (70 to 135 kg. of urea)may be applied, in three or four doses.

The most important precaution to be kept in view, while resorting to foliar application, is the concentration of the spray liquid to be used. High concentration is likely to affect the plants adversely by Scorching the leaves. A concentration of about 8 to 10 per cent, under low volume sprays and about 2.5 Per cent under high volume sprays is considered safe. One kg of urea, dissolved in 40 litres of water, would give a concentration of 2.5Per cent, and the same quantity dissolved in 10 litres would give 10 per cent concentration. About 600 to 900 litres of spray liquid may be needed per hectare per spray when high volume sprayers are employed and about 200 litres in the case of low volume sprapers. When low volume sprayers are used, sufficient care should be taken not to drench the plants with spray mixture. The crop should be only lightly sprayed and the operator should always be moving between plant rows so that the spray mixture is not deposited on the plants in a lump which may scorch the leaves.

For best best results, foliar spraying of urea may preferably be done in the afternoon hours. Most of the insecticides currently used for controlling cotton pests have been observed to be compatible with urea. Therefore, foliar spray of urea can be advantageously combined with the recommended schedule of plant protection sprays.

Source :

Condensed from Bulletin No. 1, entitled " Foliar application of Urea on Cotton " published by Directorate of Cotton Development, Bombay.

VI Research News :

1 End of June-Most optimum time for planting of Virginia Flue-Cured Tobacco in Red Soils of Bangalore.

Virginia Flue - Cured Tobacco produced in Karnataka State is praised very high in the All India Market. Being light-bodied low nocotine tobacco it is superiorin quality with highconsumers' preference and is in very great demand by Cigarette manufacturers in the country as also outside of the country. This is on account of congenial agro-climatic conditions prevailing in the State. It is mostly grown as a rainfed crop on red sandy soils in kharif season and is gaining more importance in the State.

Efforts are being made to increase the production of V.F.C. tobacco in the State and one of the important factors for higher production is the optimum time of planting. In order to find out this factor, an experiment was conducted at the main Centre, Hebbal and Field Testing Centre, Mayakonda in Davanagere Taluk during 1972–73.

The treatments included three dates of planting : 1st june, 15th june and 30th june at fortnightly intervals for two V.F.C. tobacco varieties viz., H. R.62-7 and K–51. However, one more planting date was added at Hebbal. The net plot size was 3.6 x 4.8 m. Yields of total cured leaf as well as bright leaf were noted under each treatment.

As can be observed in Table I, the results of experiment conducted confirm that the 30th June planting at Hebbal gave significantly high yield of cured leaf compared to that obtained from other dates of planting. Whereas, planting on 1st June yielded highest quantity of cured as well as bright leaf at Mayakonda, where the variety H.R. 62-7 was found to be superior to variety K–51. Therewas no significant difference between varieties at Hebbal. This needs further detailed investigation.

TABLE I

Yield in kg/ha

Treatments	Hebbal Total cured leaf	Bright leaf	Mayakonda Total cured leaf	Bright leaf
Dates				
D_1=1st June	1766	237	966	223
D_2=15th June	1766	270	926	153
D_3=30th June	1965	319	959	87
D_4=15th July	1368	206		
S.E.m	106.9	32.8	31.8	28.4
C.D.at 5%	314	N.S.	N.S.	86
Varieties				
V_1=H.R.62-7	1860	278	1045	221
V_2=K–51	1633	238	856	88
S.E.m.	75.6	23.2	25.9	23.2
C.D.at 5%	N.S.	N.S.	78	70

2) 23 D_2A x YB 14-1 and 23 D_2A x YB 14-2 :

New promising white bajra Hybrids :

At present the improved strain and hybrid varieties of pearl millet Penisetum typhoides, Burm S and H grown in different parts of India generally bear slate coloured grains. The shining translucent pearly white grains are attractive in appearance and produce white flour which is desirable from the consumer point of view.

A number of pearly white bajra inbred lines have been evolved by line viz., 23 D_2A and F_1 hybrids secured from this male sterile lines have been tested in initial evaluation trial and multilocation trails during the year 1971–72 and 1972–73. The average yield result of multilocation trials conducted at 4 locations in the year 1972-73 kharif season is given in Table-I.

Looking to the yield, grain colour and other characters, the above 5 bajra hybrids are quite promising and better than the released hybrids ziz., HB_3, HB_4, HB_5. All newly developed bajra hybrids possess pearly white grains early maturing with short stature. The hybrid 23 D_2A x YB 14-1

Comparison of yield and other physical characters of Bajra yields

Sl. No.	Hybrids	Grain yield in qtl./h.	Height in cm.	Duration in days
1	23 D_2A x WB 4–7	21.61	84	86
2	23 D_2A x WB 4-1-5	20.39	90	90
3	53 D_2A x YB 14-1	22.83	84	89
4	23 D_2A x YB 14–2	23.04	80	93
5	23 D_2A x WB 20–1	20.33	92	94
6	HB_3	19.04	102	95
7	HB_4	20.21	123	105
8	HB_5	13.83	113	108

crossing a pearly white grained Bajra BYL–1 obtained from the local collections and this line has been crossed with exotic dwarf bajra varieties and in course of time number of dwarf, early and pearly white grained inbred lines have been stabilised. Some of these promising inbred lines have been used for crossing with male sterile and D_2A x YB–14–2 appear to hold out promise for the local conditions and worth further large scale trial.

3 New varieties of Bajra, Setaria, Paspalum and Echinochola-More drought tolerant than Sorghum and Panicums :

Weather condition was very unfavourable during kharif 1972-73 season.

The total rainfall received during the year was very low (374.4 mm) compared to average rainfall received for the last 50 years (656.5 mm).

The performance of the newly developed hybrids and varieties in comparison with released hybrids and varieties during this year again provided conclusive proof that the yield levels of rainfed Sorghum, Bajra, Setaria and minor millets could generally stabilise around 1500-2500 kg/ha under erratic monsoon.

The observations gathered during the drought year 1972–73, showed that the bajra, setaria, paspalum and echinochola are relatively more drought tolerant than sorghum and panicums. The early types flowering from 55–65 days have better chance to utilise the moisture contents during dry spell and putforth some quantities of grains. Hence, breeding of early varieties for drought situation is greatly felt by the current observations.

The comparative yield performances of different new hybrids and varieties are mentioned below :

Sorghum	Yield in kg./ha. Grain	Fodder
2077 A x CS 3541	2006	7200.00
3687 x Aispuri (148)	1439.00	4520.00
CSH-1	1553.00	4629.00
C7-1195	1439.00	7406.00
D 340	1281.00	6789.00
Bajra :		
23 D_2A x YB 14-2	2304.00	2500.00
HB_3	1904.00	2000.00
HB_4	2021.00	2100.00
HB_5	1383.00	1800.00
Setaria :		
R.S. 118	1260.00	2950.00
H_1 (Local)	750.00	1750.00
Paspalum :		
IPS 92	1434.00	1784.00
Local	950.00	1800.00
Panicum miliaceum :		
RPML-1	680.00	950.00
Local	390.00	1200.00
Panicum miliare :		
1. IPM 307	690.00	1050.00
2. Local	390.00	1100.00
Echinochola :		
1. REC–25	1002.00	1400.00
2. Local	720.00	1800.00

Source : Current Research, December 15, 1973 University of Agricultural Scinces Bangalore.

VII NEWS IN BRIEF :

1 Farmers of Kolar district play a leading role in combating the pests :

Farmers of Kolar district with the technical guidance of the agricultural Extension Staff of Kolar district have effectively brought under control the pest menace on several crops, especially on hybrid maize, ragi, jowar and groundnut. The vision and forethought on the part of the extension staff of the district was the key factor which enabled the farmers to take timely plant protection measures to save the crops from damage which otherwise would have been written off as completly lost. The major pests on which effective control measures were taken consisted of swarming caterpillars, army worms and cut worms.

The area damaged by these pests was about 14,000 hectares under different crops. Concerted efforts were made by the Departmental Officials of Kolar district to stock and move plant Protection chemicals to the pest affected areas. Nearly 100 tonnes of B.H.C., parathion and malathion dusts and 250 litres of Dimecron were rushed to the farmers through the net-work of sale points. As a result, crops over an extent of 9,500 hectares were protected and saved from damage.

Technical guidance was given to the farmers by conducting group meetings, night meetings, field training, etc. Effective propaganda was made through press and also over the AIR.

The efforts made by the officials as well as farmers of Kolar district, it is hoped, would serve as an eye opener to the other districts of the State.

2 Strides in Japanese Agriculture :

Speaking under the auspices of the Indian Institute of Socio-Economic Studies in Bangalore on 10.1.1974, Dr. H. L. Kulkarny, Direcrorof Agriculture, who recently returned from a study tour of Japan was of high praise for the most efficient way the multi-purpose cooperative society functioned in a Japanese prefecture. The Society, he said, was not only incharge of arranging supplies of all the agricultural inputs needed by the farmers like, credit, seed, fertilizer, chemicals, machinery on hire etc., but also was in full charge of storage, grading, processing, marketing etc., of the farmers' produce. In fact, it could even undertake farming operations and charge the cost on the owner whenever the latter was not able to do the farming on account of his being an industrial employee. The National and prefectural Governments in Japan, he mentioned, were affording a lot

Dr. H. L. Kulkarny, Director of Agriculture, addressing a meeting of officers at Bangalore on the eve of his departure to Japan

of facilities to the farmers and this, coupled with the natural zeal of a Japanese farmer to work, was responsible for the high productivity of Japanese agriculture. Continuing, he said that the national average in rice yields which was about 2 tonnes per hectare some years back, has gone upto over 4 tonnes now and that this was a remarkable achievement. What amazed him most was the fact that nearly 61% of the rural women worked in the farms while their husbands worked in Industrial establishments. The men were mostly Sunday farmers, he observed.

The pattern of irrigation under the projects was also worth emulating, Dr. Kulkarny pointed out. Irrigation was allowed according to the needs of the beneficiaries. When water was not needed for irrigation, the farmer could store the water in cement cisterns in the fields, which were actually like Farm Ponds, for developing fishery.

As regards the sale of the produce, Dr. Kulkarny said that the Government purchased nearly 90% of it through the Co-operatives or directly at very attractive prices and therefore, the farmers did not have any problems. As regards, loan payment, his information was that there were no defaulters.

As regard life in the rural area, he said that there was no difference between a rural household or an urban household since all the modern amenities were available in the rural areas also.

VIII DEPARTMENTAL NEWS

a) Director's tour :

The Director of Agriculture was in Japan from 5th December to 21st of December on a two week observation–cum-study tour at the invitation of the government of Japan. During his stay in that country he had the opportunity to study the various aspects of Agriculture especially the working of multipurpose co-operative societies, irrigation techniques and marketing of agricultural produce.

b) Schemes : *Nil*

c) Promotions & transfers : *Nil.*

d) Publications, Extension materials and radio talks:

Fortnightly seasonal tips for the benefit of farmers in the State for the month of December were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various leading dailies for publication. The same was also sent to the All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance was collected and sent to All India Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'.

on the farm front

Volume - 8 February 1974 No. 2

FARM ADVISORY AND EXTENSION SERVICES

DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

Fertilizers for the 1974-75 cropping seasons:

Government have been giving serious thought with regard to the question of ensuring equitable distribution of fertilizers to farmers in the State in the context of the acute shortage of fertilizers in the country. The system of permit which is in vogue now has been reviewed and the Government feel that it is time that a better arrangement than what is existing now is evolved so that farmers are not put to unnecessary trouble in having to chase for the fertilizers.

Government have accordingly issued orders recently replacing the system of issue of fertilizers on permits by a system of identification cards as from 1st May 1974. The details of the Government Order are given elsewhere in this issue. Issue of identification cards to individual farmers in the State is a stupendous job. We have well over 37 lakh farm families in the State and this means that cards will have to be prepared and distributed to each and every farmer based on a scale to be seperately determined. The cards are expected to be printed and supplied shortly to the field staff. The job calls for very earnest efforts on the part of the Village Level Workers and the Agricultural Extension Officers as the whole work will have to be completed before the cropping season starts. The Deputy Directors and Assistant Directors should therefore properly brief the field staff on their responsibilities and see that the needed assistance of village Accountants and other functionaries is available to the village level workers to complete the work.

Special allotment of fertilisers is envisaged for those of the farmers who would surrender the levy grains fixed on them. This aspect should be publicised to see that the levy procurement gets a boost.

Seed requirement for the ensuing kharif:

The field staff should get busy to assess the requirement of seeds for the ensuing kharif season

and see that the Agro-Centres, Service Co-operative Societies and other agencies stock the required seeds well before the start of the season so that no difficulty is felt by the farmer on account of shortage of seeds.

Points of special note :

As the financial year is coming to a close, attention should be paid by the Executive Officers in respect of the following :

1 Data on demonstrations during kharif and rabi season should be collected, analysed and the reports submitted soon.

2 All the funds provided in the Centrally Sponsored Schemes should be properly booked and it should be seen that no funds are surrendered from these schemes.

Dr. H. L. Kulkarny
Director of Agriculture

II How the previous month was

(Seasonal and crop conditions during January 1974)

There were no reports of rainfall from any districts. The weather was mainly dry and chilly. Picking of cotton,sowing of summer crops, raising of paddy nurseries were some of the major agricultural operations carried out. The agricultural situation in brief is given below for each division.

Bangalore division :

Weather was bright with sunny days and chilly nights. Agricultural operations carried out were, harvesting of paddy, top dressing of wheat, raising of paddy nurseries, sowing of ground nut, hybrid jowar, hybrid maize, planting of potato, harvesting of sugarcane. Stemborer and mealy bugs on sugarcane were noticed. Necessary plant protection measures were taken up.

Mysore division :

Weather was mainly dry and cloudy. Raising of paddy nurseries, sowing of groundnut, hybrid maize, sunflower, harvesting and crushing of sugarcane and sowing of hybrid maize and hybrid jowar in the seed production plots and threshing of paddy and ragi were some of the important agricultural operations carried out. The were no reports of serious incidence of pests and diseases

Belgaum division :

Weather was bright and worm. Major agricultural operations carried out were planting and harvesting of sugarcane, top dressing of mexican wheat, sowing of groundnut, threshing of jowar, and picking of cotton. Boll-warms on cotton, pod borers on tur and gram, aphids, jassids and boll-worms on hybrid cotton were noticed. Necessary control measures were taken up.

Gulbarga division :

Weather was dry and hot. Harvesting of sugarcane, sowing of groundnut, hybrid jowar, hybrid maize and hybrid bajra, harvesting of paddy and picking of cotton were some of the important agricultural operations carried out. Boll worms on cotton, leafminer on groundnut, sugary disease on rabi jowar, aphids on safflower and pod borers on bengal-gram were noticed. Necessary plant protection measures were taken up to check the further spread of pest and disease menace.

III INPUTS FOR FARMERS :

Fertilizers

If things go wrong on the fertilizer front this year–there are portents that point to this eventuality, the Government and the Department cannot be blamed for this. By all accounts, the State Government has done its best, to prevail upon the centre to allot more quantities of fertilizers to this State.

But domestic production of fertilisers however large, is of little avail, if it is not accompanied by a proportionately large quantities of supplies to this State, in view of the commitments made both by the Government of India, as well as the domestic manufacturers, in the zonal conferences. Therefore, adequate and timely supplies of fertilizers, both from pool and non-pool sources, hold the key to the problem of fertilizer management.

But once again, both the Government of India as well as the domestic manufacturers have badly let down the State in the matter of supplies. As against the projected demand for 1,30,000 tonnes of Nitrogen for Rabi 73-74, the Government of India have finalised a programme to supply 68,000 tonnes of Nitrogen. Even against this modest allotment, the supplies so far made to the State both from the pool and non pool sources have been totally inadequate and unsatisfactory. During the current Rabi, the State has received only 39,842 tonnes of fertilizers in terms of Nitrogen as against the States indent for1,30,000 tonnes. As a result, the State had to pass through a very critical period of fertilizer crisis during the past few months which had grave and far reaching repercussions and impact on the State's economy besides creating problems of law and order.

Assessment of fertilizer requirements of individual States is made and supply programme drawn up and finalised at the zonal confernces of representatives of Centre, State and manufacturers held twice a year for khariff and Rabi. The zonal Conference for the ensuing khariff is being convened to be held on 25.4.74 at Cochin. Taking into consideration past consumption and the potentials created for fertilizer consumption as a result of new area brought under irrigation and implementation of production oriented crash programmes and extension of area under high yielding varieties, the State has projected a demand for 1,50,000 tonnes of Nitrogen for the khariff 1974. But looking at the picture of the overall shortages of fertilizers in the World markets, foreign exchange difficulties and fall in domestic out put, it looks as if the prospects of getting any sizeable quota of fertilizers are dim and we have to live with the shortages for some more years to come. Under the circumstances, selective and judicious use of available fertiliser becomes inevitable.

Jaya paddy for higher returns-A case study

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Paddy is an important staple food crop grown in areas where irrigation facilities are available. Among the high yielding varieties, Jaya paddy is high yielder and is also resistent to some of the important paddy diseases. In the year 1971–72, the area underJaya paddy was of the order of 8,900 hectares as aganist a total target of 16,000 hectares and in the year '72–73, the target and achievements stood at 24,275 hectares and 29,569 hectares respectively. Further,in the year 1971–72' the acreage under Jaya paddy was second to that of 1R-8 which was 9,863 hectares. Thus, the importance of Jaya paddy is gaining momentum year after year.

Sample and the data:

The data on physical input-output and cost-return relalionship of Jaya paddy was obtained by cost accounting method from 28 cultivators of Honnali taluk of Shimoga district who had grown Jaya paddy under canal irrigation during kharif 1972–73. The total area of the selected cultivators was 25.30 hectares.

Physical input-output :

The cultivators had used seed at the average rate of 58.23 kgs per hectare. This quantity of seed rate used per hectare was little less as compared to recommended seed rate (65 kgs per hectare). The average quantity of farm yard manure applied per hectare was 8775 kgs. covering an area of 11.60 hectares, which comes to about 50% of the total area under this crop. The quantity of farm yard manure applied per hectare was higher than the recommended dosage. On an average 85.53 kgs. of Nitrogen, 50.95 kgs. of Phosphorus and 39.80 kgs. of Potash per hectare was applied by the selected cultivators as compared to the recommended dosage of fertilisers i. e., N 125, P 62.5, K 62.5 kgs. per hectare. Thus, it could be seen that although most of the cultivators have applied all the three main fertilizer elements i. e. N, P, and K, the average quantity of three fertilizer elements applied was comparatively less than the recommended dosage. The average quantity of plant protection chemicals used by the selected cultivators (average for the area covered) was 61.10 kgs of B. H. C., 183.33 ml of Dimecron, 523.75 ml of Endrin and 122.70ml of Folidol per hectare covering 8.40

TABLE-I

Physical input output and cost of cultivation of Jaya Paddy in Honnali Taluk during 1972-73

Sl. No.	Items	Qty. per hectare	Value in Rs. per hectare	Percentage to total cost
1.	Seeds (kgs)	58.23	58.23	4.24
2.	Manures (kgs)	8775.00	63.63	4.63
3.	Fertilizers (kgs)			
	a) Nitrogen	85.53		
	b) Phosphorus	50.95	383.00	27.89
	c) Potash	39.80		
4.	Plant protection chemicals:			
	a) B. H. C. (kgs)	61.10	13.08	0.95
	b) Dimicron (ml)	183.33	8.75	0.64
	c) Endrin (ml)	523.75	5.05	0.33
	d) Folidol (ml)	122.70	0.98	0.07
5.	Labour:			
	a) Human labour (Mandays)	161.28	460.83	33.56
	b) Bullock labour (Bullockdays)	22.23	177.80	12.95
6.	Irrigation charges	—	52.28	3.80
7.	Repair charges	—	0.97	0.07
8.	Miscellaneous charges	—	2.15	0.16
9.	Fixed cost (total)	—	146.32	10.66
	a) Rent and Rental value	—	139.69	10.17
	b) Land Revenue and Taxes	—	4.35	0.32
	c) Depreciation charges	—	1.31	0.09
	d) Interest on investmet	—	0.97	0.07
	Total cost of cultivation	—	1373.07	100.00

Note: 1. The quantities per hectare of manure, fertiliser and plant protection chemicals were taken as averages for the area while their average costs were considered as averages for the total area under the crop.

2. The fixed costs per hectare were taken from Farm Management Studies conducted during 1970-71 in Shimoga district.

hectares, 12.00 hectares, 9.26 hectares and 3.26 hectares under each of the chemicals respectively. As per the recommended dosage the cultivators should use 1.267 ml of Dimecron or 2.962 ml of Endrin or 1.185 ml of parathian per hectare along with 3.720 ml of Hinosan or Kasumin and 20 kgs of malathion. Thus, it is revealed from the study that cultivators have not adopted proper plant protection measures and not used the recommended dosage of plant protection chemicals.

TABLE–II

Average yield kgs. per hectare gross income, net income per hectare obtained in cultivation of Jaya paddy cultivation :

	Items	Qty./amount
1	Yield (kgs)	
	a) Grain	5,057.50
	b) Straw	5,655.00
2	Gross Income (Rs.)	4,333.43
3	Net Income (Rs.)	2,960.36

The area covered under plant protection chemicals was also not upto the mark. On an average, cultivators have used 161.28 mandays of human labour and 22.23 bullock days of bullock labour per hectare.

The average yield obtained by cultivators was 5057.50 kgs. of grains and 5655 kgs. of straw per hectare. Thus, it is seen that the average yield obtained by cultivators was lower than the expected yield of 62.50 kgs per hectare. Hence, cultivators could have obtained still higher yields if they had applied recommended dosage of fertilizers, and plant protection chemicals.

Cost-return relationship :

On an average Rs. 1,373.07 was spent per hectare in cultivation of Jaya paddy. Out of which Rs.638.63 was spent towards labour input which accounted for 44.51 percent of the cost of cultivation. About Rs.383.00 was spent on fertilizers. Thus, the amount spent on fertilizers and labour inputs forms the two biggest items of expenditure in Jaya paddy cultivation. The remaining amount was spent on seeds Rs. 58.23, manures Rs. 27.86, Rs. 52.28 on irrigation charges, Rs. 0.97 and Rs. 2.15 repair and miscellaneous charges respectively.

The amount spent on fixed costs was Rs. 149.32. Of this total amount, the amount spent on rent and rental value of land itself formed the biggest item of expenditure accouting to 95 percent of the total fixed costs. The gross income obtained per hectare was Rs.4,333.43 and net income was Rs. 2,960.36.

Conclusion :

The selected cultivators could have realised a still better yield and got a reasonable amount of net income if they had adopted the schedule of package of parctices like seeds, manures, fertilizers and plant protection measures. Further, in particular, if they had applied the optimum dosage of fertilizers the yield could have been increased considerably realising a good amount of net income.

2 Studies on the use of bacterial cultures for increased yield in Cotton and Groundnut crops :

N. Balakrishna, Deputy Director of Agriculture, (Plant Pathology) Bangalore.

Atmosphere around has abundant nitrogen. This nitrogen is made available to plant by microscopic living organisms known as bacteria. Bacteria in the soil absorb nitrogen in the air and convert it in a form that will be easily available to the plants.

Azotobacter and Rhizobium are two kinds of soil bacteria capable of fixing nitrogen. While Rhizobium lives in the roots of leguminous plants, Azotobacter lives in soil itself.

Indian Agricultural Scientists are now trying to popularise among the farmers the relatively new technology of inoculation of crops with the cultures of the above mentioned bacteria for obtaining increased yields. Although this new technology has been in vogue for a long time in western countries its practical application in India on a field scale in extensive areas was taken up recently thanks to the establishment of production and distribution on a mass scale the cultures of bacteria required for different crops.

With a view to finding out the effectiveness or otherwise of the use of bacterial cultures on crops, several trials were conducted in Karnataka State and brief account of the same is given below :

The use of Azotobacter culture on Cotton :

With a view to finding out the effect of Azotobacter inoculation in the yield of cotton, several trials were conducted in the State during the year 1972–73. These trials were conducted in the farmers' fields in the districts of Bijapur, Belgaum, Dharwar, Raichur and Chitradurga on Cotton crop during 1972–73 kharif season. On the whole, 41 trials were conducted out of which 11 were conducted on irrigated cotton (Varalakshmi, Hybrid–4, Hampi) and 30 on rainfed cotton (Suyodhar, Laxmi, Jayadhar). The area of the treated plot was one acre and that of the control plot was one acre.

The method of use of Azotobacter for Cotton :

Firstly, it is necessary to prepare a sand soil culture mixture. For this purpose 25 kg of fine sand and 1 kg. of fine soil is required per acre. To 4 kg. of sand, 1 kg. of soil is added and mixed thoroughly. A little water is sprinkled on this mass and added. The remaining quantity of

sand and grain mixed thoroughly so that each sand particle is associated with some soil. Then the contents of two packets of Azotobacter culture are sprinkled over this mass. Some more water is sprinkled and mixed well so that each sand particle is associated with some soil and culture particles. The proportion of sand to soil is varied according the stickiness of the soil.

In the case of rainfed cotton the seeds required for acre are mixed with a little qnantity of mud or dung to get it ready for sowing. This mass is mixed with the sand soil culture mixture described above, and seeds so treated are drilled in the field as usual.

In the case of irrigated crop, the planting is done by dibbling. When Azotobacter culture is used, adequate quantity of manure is introduced into the dibbled first as usual, then a pinch of the sand soil culture mixture is introduced over the manure and then the seed is inserted before the dibble is closed.

Totally, 300 gm of culture was used for an acre. Similar package of practices such as manuring, weeding, interculturing, irrigation, plant protection were adopted to both the treated and control plots.

Results:

The yield of cotton has been recorded and presented in Table–I. The analysis of the data has shown that there is definite increase in yield in the treated plot as compared with the check plot.

In the case of irrigated cotton, the average per acre yield of kapas, obtained in the treated plant was 871 kg and that of check plot was 738 kg. (average of 11 plots). Thus, the additional yield obtained as a result of Azotobactor treatment was 133 kg. which works out to 21%.

The maximum increase in yield obtained was 300 kg. that is 33% over that of the control plot (900 kg) and the minimum increase in yield was 44 kg that is 17% over that of control plot (256 kg).

In the case of rainfed cotton out of 30 plots, the increase in yield was fairly substantial in 27 plots, but in the remaining 3 plots, the increase in yield was only 1 kg.

The average increase in yield recorded was 26 kg. per acre. An average yeild of 134 kgs. of kapas, was obtained in the treated plot, compared to 108kgs in the check plot (average of 30 plots).

Thus the increase in yield realised as a result of inoculation of bacterial culture is 23%.

The maximum increase in yield recorded was 118 kgs. which is 32.4 % over the yield of check plot (267 kgs.) and the minimum increase in yield realised was 4 kgs. over the yield in control plot (79 kgs.) per acre.

Economics of bacterial culture treatment on cotton :

The extra income realised per acre

by way of additional yield was Rs. 438/– on irrigated cotton and Rs. 60/– on rainfed cotton and the particulars are given below:

	Irrigated cotton	Rainfed cotton
1. Increase in yield of kapas/acre	151 kg.	25 kg.
2. Cost of the produce at Rs. 3/- per kg. of kapas	Rs. 453/-	75/-
3. Deduct Rs. 9/- being the expenditure incurred towards bacterial culture and Rs. 6/- towards labour charges.	Rs. 15/-	15/-
Extra income per acre	438/-	60/-

2. The use of Rhizobium culture on groundnut:

With the object of finding out the effect of Rhizobium culture inoculation on the yield of groundnut, 20 trails were conducted during 1972–73. Out of these, 13 were conducted on irrigated groundnut during summer in the districts of Chitradurga and Bellary and 7 were conducted on rainfed groundnut in Bijapur district during kharif season. In Bijapur district only one trial could be finally taken up as the other 6 trials were given up due to extreme drought.

The area of the treated plot and that of check plot was one acre each.

The method of use of Rhizobium on groundnut:

A quantity of 200-300 gm of bacterial culture was used for treating seeds for one acre.

The seeds of groundnut (kernel) were dipped in water, and then taken out on a clean gunny cloth or polythene sheet. The contents of culture were poured on the seeds at the rate of two tins per acre.

With two persons holding the cloth on two sides, the seeds are gently rolled on the cloth by raising the two ends of the cloth alternately. It is rolled in such a manner for a few minutes until some particles of culture powder are found to be sticking to each seed. Care is taken to see that the seeds are not mixed by hand. The treated seeds are kept in shade and are sown the same day.

Manuring, weeding, interculturing irrigation, plant protection, etc., were done as usual for both treated and control plots.

The yield of groundnut is recorded and presented in Table II. The analysis of the data on 14 trails has shown that there is an increase in yield in treated plots.

TABLE–1

Yield data of the Azotobacter bacterial culture treatment trials on cotton, conducted in 1972–73 (yield of kapas in kg./acre).

Sl. No.	District	Irrigated: Treated	Irrigated: Control	Irrigated: Extra Yield	Percentage increase in yield	Rainfed: Treated	Rainfed: Control	Rainfed: Extra Yield	Percentage increase in yield
1	Chitradurga	943	791	152	19	93	87	6	8
2	Raichur	800	685	115	16.8	139	106	33	32
3	Bijapur	—	—	—	—	95	83	12	15
4	Belgaum	—	—	—	—	182	138	44	33
5	Dharwar	—	—	—	—	160	126	34	28
	Total :	1743	1476	267	—	669	540	129	—
	Average yield of the state	871	738	133	18.0	134	108	56	23

TABLE–2

Yield data of Rhizobium bacterial culture treatment trials on groundnut conducted in 1972–73 (yield of groundnut in kg. per acre).

Sl No.	Name of the District	Treated	Control	Extra yield	Percentage
1	Chitradurga (Irrigated)	944	893	51	5.7
2	Bellary (Irrigated)	675	527	148	28.0
3	Bijapur (Rainfed)	500	400	100	25.0
	Total	2119	1820	299	
	Average	706	607	99	16.4

The yield obtained in the treated plot was 706 kg and that of control plot was 607 kg (Average of 14 plots). The additional yield realised as result of Rhizobium treatment was 99 kg which works out to 16.4 percent.

The maximum increase in yield obtained was 279 kg that is 42% over that of the control plot (658 kg).

Economics of bacterial culture treatement on groundnut :

The extra income realised by way of additional yield is Rs. 180/- per acre as given below :

1. Increase in yield per acre — 99 kg.
2. Cost of the produce at Rs. 2/– per kg. — Rs. 198/-
3. Deduct Rs. 9/- being the expenditure incurred towards the cost of bacterial culture and Rs. 6/– towards labour charges. — Rs. 15/-
4. Extra income per acre. — Rs. 183/-

V GLEANINGS FROM OTHER JOURNALS;

I Sowing Techniques for getting high yields of high yielding Wheats

For any crop to yield well should have good stand so is the case with wheat too. For this, scientists of the Agronomy division of Indian Agricultural Research Institute, New Delhi, recommend this new tenhnique. Excellent crop stand, they say, does not merely depend on seeding rate, but on several other factors also such as depth and method of sowing seed treatment, availability of moisture at sowing time and techniques for late sowing.

Seed rate:

The seed rate should be adjusted according to the size of the seed and tillering habit of the variety. For instance, Sonalika grains are bolder. But it has very poor tillering habit. So sow 100 to 120 kgs. of Sonalika seeds per hectare. In the case of Kalyan sona, it is enough if you sow 75 to 100 kg. per hectare as the seeds are smaller in size and the plants have got the profuse tillering habit. Further if you have to sow late, use high seed rate–upto 150 kg. per hectare. This is a must for getting a satisfactory stand.

Time of Sowing:

Sow the seed at the proper time. The normal sowing time for Kalyan sona is from 7th to 21st Nov., Further by advancing the date of sowing you are sure of getting high wheat yields.

Depth and method of sowing:

The optimum depth of sowing of high yielding wheats ranges from 4 to 6 cms. Only such shallow sowing helps seedlings grow better. Sow the dwarf wheats either by "kera" method or by a drill but not by a Pora as is normally done. The drill-sowing ensures better germination and more uniform stand of crop. Use a 7 furrow seed-drill with rows 20 to 23 cm. apart.

Seed treatment:

Make it a must to treat the seed before sowing to check the seed-borne diseases. Treat the seed with Agrosan GN or Cereran or Captan at one part of the chemical with 300parts of seeds byweight. To over come the insect pest attack on the young wheat seedlings treat the soil also by broadcasting 5% BHC. wettable powder at 10 kg. per hectare over the soil surface before the

sowing.

Optimum moisture at sowing time:

For proper and satisfactory germination of wheat seed the soil should have optimum moisture within the surface layer to a 6 cm. depth. Give a pre sowing irrigation if necessary. If sowing is delayed and it is to be done in dry soil, better give a light irrigation just after sowing for getting satisfactory germination, particularly on lighter soil.

Late sowing techniqucs:

If you are sowing wheat varieties like "Sarabathi Sonara" and "Sona-lika" very late, i.e. in the month of Dec. adopt the followiug practices to get the maximum germination and a more rapid growth of the young seedlings.

i) Soak the seed in water for 24 hrs. before sowing, as this would help in germinating the seeds 3 to 5 days earlier than the unsoaked ones.

ii) Spread well decomposed farm yard manure on the soil. This will raise the soil temperature by getting the heat from the sun and by stimulating greater microbial activity in the soil.

By adopting these modern techniques you can easily get high yeilds from your wheat crop.

Source : Farmer and Parliament, Vol. VIII, No. 9, Sept. '73

2) Tips for higher rice yield

Four tonnes of paddy per hectare even in rainfed areas is not a myth. The high yielding early rice varieties like Cauvery, Bala, Pusa 2-21 or Padma are clicking well in the rainfed areas. These varieties of rice can even be grown in areas with 1000 mm. rain fall. The scientists of the Uttar Pradesh Institute of Agricultural Sciences, Rice Research Station, Faizabad who conducted a number of field trials and obtained high yields give the following tips to the farmers raising rice in rainfed areas:

i) Get your field levelled properly and bunded so that rain water is impounded and not allowed to run off.

ii) Plough the field well before the monsoon.

iii) Sow just before or soon after the first shower.

iv) Drill 30:30:30 NPK fertilizer mixture before sowing seed so that the plant nutrients are readily available to the growing roots which results in best yeilds.

V) Use a high seed rate upto 70 kg. per hectare and sow in rows about 23 mm. apart behind the plough or by a seed drill.

VI) Weed well. Both hand weeding and spraying of chemical weedicides are to be done three weeks

after sowing or when the plant puts forth the third leaf. The Propanil compounds sold in the market are very effective against weeds such as Echinochloea or panicum. To control the broad-leaved weeds, M C P A or machette can be sprayed.

vii) Top dress with nitrogen once or twice between the 3 and 6 weeks after sowing at 15 kg. nitrogen per hectare each time.

viii) Take proper plant protection measures as soon as any pest or disease appears.

ix) Do not allow water to stagnate in the early seeding stage.

By adopting these improved methods high yielding and improved varieties like Cauvery, Bala, and N 22 have yielded 45 to 50 quintals an hectare in trial plots even under the acute moisture stress-conditions in different parts of the country as against 12 quintal yield of local varieties.

Source : *Pesticides, Vol. VII, No. 12, Dec. '73*

3) Standardization of the quality seeds

Need for quality control :

Though inputs other than good seeds are equally important for a balanced growth of the crop, the role of good seeds is pivotal for enhancing productivity. Scientific research aiming at the increase of crop production would be of little value unless seeds possessing the desired genetic and physical qualities, such as vigour, germination and freedom from impurities including weeds, are readily available to the farmer. If the purity of a seed lot is 80% and viability 80% pure live seed of the lot of that the farmer gets is only 64% and therefore, it is no wonder that very often the results achieved of such inputs are not reproduced on the field. The Agricultural practices recommended to the farmer are based on the assumption that seeds with assured purity, both genetic and physical, would be available to him. The farmer and the nation lose heavily if anticipated response is not obtained by adopting a certain set of agricultural practices.

Only seeds with good germination and vigour can give a good stand of crop. Otherwise, there would be inadequate plant population and consequently low yields. A mere increasing of seed rate might compensate for pure germination but it cannot ensure vigorous growth or uniformity in plant population. The other aspect of quality, namely, freedom from admixture and weeds is of even greater importance. Admixtures might be of other varieties, undesirable plants and inert material. Some of these might convey harmful Pathogens and cause diseases. The use of quality seeds is the cheepest method of increasing agricultural production requiring little or no

foreign exchange but calling for an organised effort. The release of high yielding varieties of paddy, wheat, jowar, maize and bajra have opened new avenues for productivity in agriculture. There is another aspect of the importance of good seeds. Although seed is the cheapest input and it forms only a small part of the cultivation expenses of the farmer, on this vital input depend the returns from other costly inputs. All efforts and investment can be unremunerative if good seeds of recommended varieties are not available. The farmer is aware of the importance of good seeds and is preapared to pay for them.

The essence of any seed programme consists in quality control. It should be realised that the seed is no different from the grain only if certain qualities which are important from the point of view of genetic purity are preserved carefully. The seed programme without quality control will, therefore, result in failure. There are various methods of controlling the quality of seed and chief among those recommended by the administration are a) seed certification, b) seed law enforcement.

Seed certification :

The term "seed certification" refers to certification of seeds primarily for genetic purity though the certifying agency ensures that the seed certified conforms to at least certain minimum standard of germination, freedom from weeds, mixture, moisture, etc. Seed certification requires the inspection of field crop to ensure that minimum standard of genetic purity is obtained. The isolation requirements of such crops are checked. The plants are also checked for purity of variety and any off-types are rogued out. If the number off-types is above a certain percentage or if pollination occurs in other than the desired manner, the field is not considered fit for certification and is rechecked.

Field inspection is of course the core of any certification work but other checks are equally essential. Various other checks to be considered in this connection are as follows :

a) Evaluation of the growing crop for obtaining data for trueness to variety, isolation requirements to prevent cross-pollination and conditions as regards diseases, obnoxious weeds and admixtures.

b) Supervision of agricultural and commercial organisations connected with harvesting, storage, transport and processing with a view to preserving the indentity of the lots.

c) Evaluation of the external quality through laboratory test of a representative sample drawn by the certification agency. The laboratory test might be carried out by an authorised station to determine the percentage of germination, moisture content, weed content, admixture and purity.

d) Evaluation of the lot for the purpose of checking the homogeneity

of the bulk as compared with the sample inspected; and

e) Quality checks of the seeds which the farmer ultimately uses.

It is clear that the seed certification is essentially a process of quality control in the sense that what is tested is not the final product but the checking of quality at each stage of the development of the crop to ensure the final product is indisputably of the desired quality. The process of developing quality control techniques as applicable to industrial goods will be a combersome procedure. But at the same time, if the farmers interest is to be safeguarded, it is worthwhile to introduce statistical quality control at various stages of operation of seed production. Unlike industrial products, seeds of a crop have to prove their quality under a variety of conditions. The performances of the same quality of the seeds will be different under different field conditions. If the confidence of the farmer is to be won, it is necessary to indicate along with the quality of seeds other requirements that should be satisfied in maintaining that quality standard. For example, if we consider the germination quality of seeds, the germination percentage will be greatly affected by the soil conditions and the mode of sowing. It may be sufficient to indicate always the minimum germination percentage of a given type of seed but is also necessary to indicate the varying percentage of germination under varying soil and climatic conditions.

Sampling Method :

The first requirement in seed testing is the development of appropriate sampling procedure. For accurate determination of the quality of seed,the sample has to be taken in four stages. The first stage will be examining the crop sown for seed purposes in the field when it is ready for harvest. A representative sample of the crop in the field has to be taken to assess the quality of crop for seed purposes. It is generally assumed that the fields used for growing crop for seed purposes are well–levelled, and homogeneous in soil fertility. A random sample of 4 to 10 cuts each of a size of a square metre may provide a reasonably good idea of the quality of crop at that stage. Such samples of crop should be properly harvested and their grain examined for various characteristics of good seed. This examination of sample would form the basis for accepting or rejecting the produce for seed purposes. This operation should normally be conducted by the manager or the breeders themselves.

The second stage of sampling would arise after the crop has been harvested, threshed and is being stored in bulk for seed purpose. No matter how – efficiently a quality analysis or test is carried out, it is of little value unless the factual sample examined is truely representative of the seed lot as a whole. Consequently, sufficient care needs to be exercised to ensure that the samples taken for analysis are representative of the lot in question. A proper sampling for testing has to be

evolved if the bulk of the seed is contained in bags. It would be desirable to sample a few bags and then within the bags a small amount of grain for further examination. The number of bags and the quantity of seed to be sampled would depend upon the type of seed being tested.

The third stage of sampling will arise when the seeds released and distributed to farmers for sowing purpose to ensure that the quality of seed had not deteriorated during storage. This could be judged by again examining the bulk of seeds by the sampling method. At this stage also, the same sampling method as at the second stage could be adopted. Types of test to be applied for determining the quality of seeds could be determined by the breeders themselves. The sampling may, however be evolved and tested under actual conditions by competent statisticians experienced in quality control techiques.

The fourth stage of sampling involves verification of the findings of seed testing results with their actual performance in the field. This could be done by a random selection of a few fields sown with the prescribed seeds. In this case, the sampling procedure as prescribed for the first stage might be adopted. The fourth stage of testing seed is simply to verify and confirm the correctness of the sampling procedures followed at earlier stages.

Conclusion:

If the actual performance of the quality seeds differs considerably from the expected performance, it would be important to determine the reasons for the deviation. The whole process would, thus, require a kind of - continuous operational research in fixing standard quality of seeds. Seed production industry would, therefore, need the backing of a well established statistical unit for continuous research in the method of quality control of seeds. Such units should work in close collaboration with the plant breeders, seed production managers, and finally with the seed consumers, namely, the farmers.

Source : Condensed from ISI Bulletin Vol. 25, No. 11, Nov. 73

VI Research News

Foliar application of urea can substitute top dressing for rainfed cotton :

Top dressing of rainfed Cotton through soil application of fertiliser is generally not possible, particularly in the low rainfall areas. Also by that time the roots of cotton plant will have gone deeper. Hence an experiment was conducted at All India Co-ordinated Cotton Improvement Project, Main Centre A. R. S. Dharwar, (annual rainfall 760 mm) for three years (1969-70 to 1971-72) and at Gadag (annual rainfall 626 mm) and Bagalkot (annual rainfall 643 mm) for two years (1969-70 to 1970-71). Varieties used were 'Laxmi' (G. Hir--sutum) at Dharwar and Gadag and 'Suyodhar' (G. herbaceum) at Bagalkot. Treatments included no fertiliser, 30 kg. N/ha (basal application) and 30 kg. N/ha (basal) +top dressing at 15, 30 and 45 kg. N/ha through soil and through Foliar spray. While top dressing through soil was done in one dose between 45 to 60 days of sowing that through Foliar spray was done in three instalments viz., 2:3:5 ratio at square formation, flowering and boll formation. The results obtained were :

i) Application of 30 kg. N/ha as a basal dose at sowing time increased the yield of seed cotton by 30, 2 and 17% at Dharwar, Gadag and Bagalkot respectively. The very low response at Gadag may be probably due to unfavourable climatic factors, during those years.

ii) Top dressing through soil did not increase the yield both at Dharwar and Bagalkot at any of the levels of nitrogen tried. However at Gadag, top dressing through soil at the rate of 30 and 45 kg N/ha increased the yield of Kapas by 9.7 and 14% respectively.

iii) At Dharwar, Foliar top dressing urea at 15, 30 and 45 kg. N/ha increased the yield by 27, 69 and 99 kg./ha (4.4, 11.3 and 16.2% respectively). When the economics was worked out, it was found that 30 and 45 kg. N/ha have an additional income of Rs. 61/- and Rs. 103/- per hectare respectively. The lower does of 15 kg N/ha did not result in profit.

iv) At Gadag, the same treatments gave 65, 167 and and 70 kg/ha (7.5, 19.4 and 8.1%) higher yield, resulting in an additional income of Rs. 84/- Rs. 306/-, and Rs. 31/- per hectare respectively.

v) At Bagalkot, Foliar top dressing also did not increase the yield.

The results show that in the absence of top dressing through soil, it is possible to increase the yield of cotton profitably by the foliar spray of Urea at 30 to 45 kg N/h. The profits are likely to be still higher if Urea is combined with pesticide spray wherever possible.

2) February is the optimum time for planting of 'Madhu' paddy :

Madhu, a newly released variety of of paddy by the University of Agricultural Sciences is spreading over a large area around Bangalore. The crop is usually grown during summer season, irrigated by tanks and wells. Being a recent variety, it is of importance to obtain relevant data regarding the optimum date of planting, which would prove useful for the farmers of the area.

Keeping this objective in view, a small scale trial with three different date of planting was conducted during the summer months of 1973. Cultural practices adopted, however, remained the same for all the three treatments.

Each treatment was tested in a four gunta plot, replicated. Seedlings of same age was selected for planting in 3 test plots. A uniform spacing of 6" x 4" between row to row and within the row was adopted. The other cultural practices such as application of basal dose of fertilisers, top dressing, weeding, inter-cultural operations, spraying etc., were as per the package of practices, i.e., fertiliser dose 120:60:60 NPK in kg/ha; N was applied in split doses viz.,50 percent basal, 30 percent 4 weeks after transplanting and 20 percent after 6 weeks. P and K were applied with basal dose. Weeding was done once in the nursery, and thrice in the field after transplanting with Hinosan. Roger and Labacid.

From the result, it is evident that planting date affects the yields of Madhu. planting this paddy variety during the second fortnight of February gives better yield as compared to the yield obtained from the crop planted in first fortnight of March. The reduction in yield observed, when planted in January could be attributed to the production of lesser number of productive tillers which is resulted due to low temperature. In contrast,

Effect of date of planting on yield and yield attribute characters in paddy CV 'Madhu'

Plot No.	Date of planting	Days to maturity	Ht. of the plant in cm	Av. No. of pro-tillers per plant	Length of the panicle in cm	No. of grain per panicle	Yield in in kg/ha
1.	25–1–1973	148	74.3	9.7	20.7	106	6000
2.	28–2–1973	127	79.4	12.8	20.8	110	8000
3.	15–3–1973	135	70.7	8.5	20.8	115	5250

high temperature in the month of march affects the production of productive tillers thus reducing the yield.

From the results, it could be inferred that second fortnight of February may be ideal time for planting Madhu, paddy for good yields.

Suphala is a good source of nitrogen for tobacco in Bangalore region :

Nitrogenous fertilizers are many. In order to find out which of them are suitable sources of Nitrogen in enhancing the yield and quality of tobacco, an experiment was conducted at the main Centre, Hebbal and Field Testing Centres, Nyamathi and Mayakonda during 1972–73.

Five treatments from different sources of Nitrogen viz., Ammonium sulphate, Calcium ammonium nitrate, Urea, Amophos and Suphala to supply 20 kg N/ha were included. The common dose of P_2O_5 and K_2O were applied at the rate of 80kg/ha. Where Amophos and Suphala were applied, the p_2o_5 levels being made up by applying additional quantities of superphosphate. The experiment was laid out as per randomised block design with six replications having net plot size of 3.6x4.8m. The tobacco variety used in the experiment was K-51.

The results obtained are presented in Table I. The yield of total cured leaf refers to quantity and the yield of bright leaf refers to the amount of quality tobacco realized. From the data, it is observed that no significant difference was noticed in the total cured leaf produced by different treatements at all the centres. However, the treatments showed significant difference in the quantity of bright leaf obtained at Hebbal centre. Application of Suphala as the source of nitrogen has given the highest yield of bright leaf i. e., 223 kg/ha., thus it enhances the amount of quality tobacco produced. This was followed by the effect of application of ammonium sulphate which provided 204 kgs. of bright leaf per hectare. Effect of urea was significantly low in this respect.

From the above study, Suphala can be considered as most suitable source of nitrogen for tobacco grown in Bangalore region.

TABLE-I (Yeild in kg/ha)

Treatments	Hebbal		Mayakonda		Nyamathi	
	Cured leaf	Bright leaf	Cured leaf	Bright leaf	Cured leaf	Bright leaf
1 Ammonium sulphate	208!	204	899	61	932	163
2 CAN	1970	156	966	54	1016	168
3 Urea	1825	134	837	64	1014	168
4 Amphos	211	1359	886	102	896	152
5 Suphala (20–20–0)	1940	223	922	96	868	144
C. D. at 5%	N.S.	40	N.S.	N.S.	N.S.	N.S.

Source : Current Research, Vol. III No I Jan. 15 1974 U.A.S. Bangalore-24

VII News in brief :

1) Government issues orders on fertiliser distribution :

Government have reviewed the entire system of distribution of fertilisers and the system of permits which was introduced during the last rabi season. After considering all the aspects involved in the distribution of fertilizers, Government have decided that the system of issuing fertilisers on permits shall be discontinued. Government further decide that in place of the system of permits for the issue of fertilisers the system of identification cards would be introduced on which farmers would be able to draw their required quantity of fertilisers. The identity cards would contain details about the farmer, the village where he resides, the extent of land held by him and cultivated by him and the various inputs required by him. This card would also contain details about the amount of foodgrains he is to surrender to Govt. as levy. This new system will be introduced from the 1st of May 1974.

Issue of fertilisers to farmers who discharge the levy quota of foodgrains :

Government have also considered the need to make available adequate fertilisers to all farmers who discharge their levy quota of foodgrains. One of the measures is to issue a special quota of fertilisers as an incentive to all farmers who surrender grains according to the levy demand.

It was therefore felt that such of the farmers as would surrender the levy quota of foodgrains to government would be given fertilisers according to the following formula :

	Crop	Quotaper tonne of levy of foodgrains
1	Paddy	50 kgs of N
2	Jowar	30 kgs of N
3	Ragi	30 kgs of N

A special quota of fertilisers would therefore be earmarked for this purpose. This system of special supply of Fertilisers linked with levy of Foodgrains will come into effect from the date of issue of these orders. The operational arrangements in this regard will be determined by the Deputy Commissioners of the Districts in consultation with the District Fertiliser allotment committees.

Issue of fertilisers for preparation of mixtures :

With regard to the fertilisers supplied under the pool allotment, Government have decided not to issue any fertilisers for the preparation of hand-mixtures. As regards fertilisers from

the non-Pool allotment mixtures would be permitted only in cases where the manufacturing firms agree to the mixing of their products. All such mixtures would have to be sold within the State according to the supply programme drawn up for each district.

Issue of fertilisers against 'B' component of institutional finances :

In view of the acute shortage of fertilisers and in view of the fact that the system of supply of fertilisers has been revised and rationalised, all the available supply of fertilisers would now be distributed to the farmers on a pro-rata basis and in reduced quantities according to the scale or doses for each crop to be notified by the Government. Accordingly all farmers who get credit from the various institutions would be eligible for their quota of the 'B' Components of fertilisers at the scale to be notified.

Issue of fertilisers for special programmes :

In as much as the supplies and allotment forthe coming Kharif season, being far below the requirements, Government have decided to rationalise the quantities to be distributed for each type of crop. The Government would therefore issue a notificatoin in this regard indicating the broad outlines of priority for the various types of crops and scale of doses for each type of crop. After considering the several aspects of Agricultural Production and the priority sectors for the production programme, Government decided that the following special programmes would receive the full doses of fertilisers :

1. Hybrid Seed Production Programme.
2. Integrated Dry Land Agricultural Development Programme.
3. Virginia Flu Cured Tobacco Cultivation.
4. All Demonstrations.

2) Congress Exhibition opens at Subashnagar grounds:

Congress exhibition at the Subash–nagar grounds was thrown open to public on the 6th February 1974. The Department has participated in a big way. The joint pavilion put up by the Department and the University of Agricultural Sciences is attracting good number of people daily. An interesting feature of this year is the display of various types of tractors and power tillers of the Indo-Japanese Agricultural extension Trainning centre, Mandya. The theme of the Agricultural University is "How to meet the fertilizer crisis".

VIII DEPARTMENTAL NEWS:

a) Director's Tour :

The Director of Agriculture was in New Delhi on 5-1-74 to attend the meeting of the panel of Administrators of National Commission on Agriculture. During his tours in the State he reviewed the progress of various agricultural programmes in Chitradurga, Dharwar and Belgaum districts and instructed the subordinates to show better progress in the coming months. He has inspected seed farms at Zadshapur and instructions were issued to the subordinates regarding various farm operations. He participated in the field day of U.P.-301 Wheat at Chikodi on 13-1-74. He met the representatives of Zuari Chemicals and had discussions with them about the problems in meeting the fertilizer demand in the context of fertilizer scarcity in the country. He visited New Delhi again on 17-1-74 to attend the meeting of annual plan. He was in Cochin from 24-1-74 and 25-1-74 and attended Southern Zonal Conference on fertilizer and seeds convened by Government of India.

b) Promotions and transfers:

The following Deputy Directors of Agriculture were promoted and posted as Joint Directors of Agriculture:

Sl. No.	Name & designation of the officer	Where posted
1	Sri N. Narasimhaiah Deputy Director of Agriculture (Project officer, Agronomist) I.D.L.A.D., Hadagali	Joint Director of Agriculture (Training), Bangalore.
2	Sri G. S. Sathyanarayana Deputy Director of Agriculture (Crop Botony), Bangalore	Joint Director of Agriculture Gulbarga (Newly created post)
3	Sri H. N. Kamath Deputy Director of Agri. Mangalore	Project officer S.F.D.A. Karwar
4	Sri T. V. Basavaraj J. D. A. under orders of posting as project officer S.F.D.A. Karwar	Joint Director of Agriculture (Pulses), Bangalore

c) Schemes: *Nil*

d) Publications, Extension materials and Radio talks:

Fortnightly seasonal tips for the benefit of farmer's in the State for the month of January were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio, Bangalore for broadcast regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'.

Compiled by :

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FARM ADVISORY AND EXTENSION SERVICES

DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

Cover Page :

The evolution of Varalakshmi & Hybrid-4 varieties of Cotton have brought dramatic changes in the yields of the crop

March being the last month of the financial year, we have to review and evaluate our performance in the various fields. The programmes taken up in the districts under various develoment schemes, (ii) their implementation and achievements, (iii) the effects of seasonal conditions on agricultural production during kharif, rabi and summer, (iv) the financial allotments under each scheme and the expenditure incurred etc., need to be critically reviewed. In the light of last years experiences effective steps will have to be taken for better peformance during the next year. It is therefore imperative on the part of all the concerned officers to pay more attention to this part of extension work i.e., assessment and evaluation.

It is presumed that most of the districts would have already fomulated the annual programmes for 74-75 giving targets under different schemes. Maximum efforts should be put in to step up agricultural production particularly food production by launching vigorous campaigns. Sunflower which is an oilseed crop, introduced in the State during 71-72 is slowly gaining popularity and as such more and more area should be brought under this crop. The extension workers should help the farmers to get their requisites well in time to enable them to carry out the various agricultural operations right from the beginning of next kharif season. Government have already taken a decision to ensure equitable distribution of fertilizers to farmers by introducing card system in the context of the acute shortage of fertilizers in the country. The Village Level Workes and the Extension Workers should make earnest efforts to complete this stupendous job before the kharif season starts. The Officers at District and Sub-Divisional levels should properly guide the extension workers to complete this work within the stipulated time

Plant protection equipment is being sold to farmers on subsidy basis and the amount allotted by the Government should be fully utilised before the

end of March. The amount allotted for rat control should not be allowed to lapse.

The funds provided under Centrally Sponsored Schemes should be spent fully and no funds should be allowed to be lapsed or surrendered.

Dr. H. L. Kulkarny
Director of Agriculture

II How the previous month was

(Seasonal and crop conditions during February 1974)

The weather was mainly dry and hot. Raising of paddy and ragi nurseries, planting of sugarcane, sowing of summer crops, transplanting of paddy and ragi, were some of the important agricultural operations carried out. There were no reports of serious incidence of pests and diseases. The agricultural situation in brief for each division is given below:

Bangalore division :

Weather was bright and hot. Sowing of hybrid maize, hybrid jowar, groundnut and sunflower, raising of paddy and ragi nurseries, planting of sugarcane, harvesting of hybrid maize, threshing of pulse crops were some of the important agricultural operations carried out. Aphids and leaf miner on grounduut, stemborer on hybrid maize and hybrid jowar were noticed. Necessary control measures were taken up.

Mysore division:

Weather was bright and warm, but it was cool and chilly during night. Agricultural operations carried out were transplanting of paddy and ragi, sowing hybrid maize, hybrid jowar and groundnut, harvesting top dressing and earthing up of sugarcane, preparation of land for transplanting of paddy and ragi, fall ploughing, inter-cultivation in seed production plots, and sowing of pulse crops. There were no reports of major incidence of pests and diseases excepting mild attack of stemborer on ragi and blight and thrips on paddy nurseries in parts of Mysore and Nanjangud taluks. Necessary plant protection measures were taken up to bring the pest and disease menace under control.

Belgaum division :

Weather was dry and hot. Harvesting of beedi tobacco, wheat, rabi jowar, gram and sugarcane, sowing of hybrid jowar, hybrid maize, planting of sugarcane, picking of cotton, transplanting of paddy and sowing in the seed production plots of hybrid bajra were some of the major agricultural operations carried out. Pod borer on tur, bollworms on cotton, aphids on summer groundnut, leaf rollers on paddy were noticed. However necessary control measures were taken up.

Gulbarga division :

Weather was mainly hot during the

day, but it was chilly during the night. Important agricultural operations carried out were harvesting and planting of sugarcane, harvesting of rabi jowar, hybrid maize, wheat, picking of cotton, sowing of hybrid jowar, groundnut and sunflower. Pod borers on bengalgram, leaf miner on groundnut were observed and against which necessary plant protection measures were taken up.

INPUTS FOR FARMERS:

Plant Protection Chemicals:

The supply position of Plant Protection chemicals during the month in the State as a whole is not encouraging and the prices are also increasing day by day. The two main supplying organisation, namely the Agro Industries Corporation and the Karnataka State Cooperative Marketing Federation, Bangalore are trying their best to procure the required quantities of pesticides and stock the same in their respective selling points throughout the State. In addition the Karnataka State Co-operative Marketing Federation have programmed to start a formulating unit of their own and about 3 tons of Technical material (Endrin) are already allotted to them by the Government of India. Further, in order to tide over the present difficulty with regard to the timely availability of plant protection chemicals, efforts are being made to procure as much quantity of Technical material as possible from the Government of India, ditribute the same to the extent possible among the formulators within the State and see that all the formulated materials are sold in Karnataka State only.

During the month the following facilities are made available to farmers by the Department of Agriculture for popularising plant protection in the State.

i) E.D.B. ampules are distributed throughout the State under demonstration programme to popularise store pest control.

ii) Rodent control programme is in operation according to which 50% of the cost of the programme is borne by the Department and the other 50% is borne by the beneficiaries in case the control operation is to be taken up in contiguous area of 500 acres.

iii) Under Pulse Development Scheme 50% subsidy on plant protection chemicals and plant protection equipments is made available to farmers.

iv) Subsidy is also extended for purchase of plant protection chemicals and plant protection equipments under Intensive Cotton Development Programme, Dharwar.

v) Subsidy to the extent of 25% and a maximum of Rs. 200/- is offered in case of purchase of hand operated and power operated sprayers respectively in order to popularise owning of plant protection equipment by farmers themselves.

IV ARTICLES CONTRIBUTED BY THE DEPARTMENTAL OFFICERS

Economics of Hybrid-4 Cotton Cultivation (Commercial) in Sindhanoor Taluk of Raichur District 1972-73 A Case Study

T. M. Gurumallappa, A.A.O., & M. K. Parthasarathy, Asst. Statistician, Farm Management, Hebbal, Bangalore.

Cotton is an important fibre crop grown extensively in our country and it is the oldest among the commercial crops of the world. Clothing for mankind is the chief purpose for which it is cultivated and cotton is also used in various forms in the industry.

Cotton is essentially a tropical crop but its cultivation is carried on successfully over many parts of the world. The chief cotton producing countries in the world are U.S.A., India, Egypt, Russia and others.

Though India produces about 15% of the total world production, the country requires an import of 1.30 million bales of cotton every year to meet the demands of the Mills. Thus, the country is importing rupees 100 crores worth of cotton every year. *

In the recent past a spectacular change in the production of cotton has been observed. The introduction of new high yielding and hybrid varieties have revolutionalised the cotton industry. Many hybrid and high yielding varieties are being raised by the farmers. In the Tunga Bhadra Project Area with irrigation facilities all the year round and with black cotton soils the area is best suited for raising cotton crop. Many farmers of the Ayacut area are now raising the high yielding and Hybrid varieties of crops. Therefore it was thought fit to analyse the economics of raising H_4 Cotton (Commercial purposes) and find out whether the cultivators are adopting the full package of practices to exploit the genetic potentiality of of Hybrid Seed.

The sample and the data:

This study is confined to Sindhanoor taluk in Raichur district. Two villages namely Mukkunda and Huda which

* *Sukla Hazra : The new face & Cotton, Intensive Agril Vol. X, No. 7, Sept. 1972, P 1-3.*

were selected by the Project Officer (M.C.) for organising the demonstrations were selected purposively for this study. A total of 14 cultivators, 6 from Mukkunda and 8 from Huda village, who had grown H_4 Cotton were selected for the study. The data was collected by the fieldman working in the Farm Management Scheme with his head quarters at Mukkunda, in the questionnaire designed for the purpose. The data relates to 1972-73 crop season and covers an area of 37 acres.

The findings of the study are summarised in the following pages. Mainly, attention is bestowed on the physical input output levels and the adoption or otherwise of the recommended package of practices in the cultivation of this crop.

Physical input output relationship :

Table 1 presents the physical input output data in cultivation of this variety. The selected cultivators used 38 kgs. of seed on 37 acres. Thus, on an average of 1.02 kgs. of seed was used per acre. The average total quantity of Farm Yard manure applied per acre works out to only 1486.48kgs. The sample cultivators used 2343 kgs. of N, 953 kgs. of P_2O_5 and 1050 kgs. of K_2O on the entire area of 37 acres. It shows that on an average 63.27 kgs. of 'N' 25.75 kgs. of P_2O_5 and 28.37

TABLE-I

Physical Input-output Relationship in the cultivation of H_4 Cotton (Commercial) in Sindhnoor Taluk of Raichur district.

Sl. No.	Items	No. of cases	Total area (acre)	Qnty. for the whole area covered	Qnty. per acre
1	Seeds (kgs.)	14	37.00	38	1.02
2	Manures (kgs)	14	37.00	55000	1486.48
3	Fertilizers :				
	N	14	37.00	2343	63.27
	P_2O_5	14	37.00	953	25.75
	K_2O	14	37.00	1050	28.37
4	Plant protection chemicals :				
	a) Savin (kgs)	14	37.00	328	8.86
	b) B.H.C. (kgs)	14	37.00	950	25.67
	c) Endrin (ml.)	14	37.00	19425	520.27
	d) Dimicron (ml.)	14	37.00	8900	240.54
	e) Folidal (ml.)	14	37.00	200	5.40
5	Labour (mandays)				
	Men	14	37.00	1467	39.62
	Women	14	37.00	1022	16.57
	Children	14	37.00	—	—
	Bullock Labour (Bullock days)	14	37.00	—	14.39

kgs. of K_2O was supplied per acre by the sample cultivators.

The selected cultivators used many chemicals to control pests and diseases. Among the important ones, Savin, BHC and Endrin were used by almost all the cultivators. The other plant protection chemicals used were Dimicron and Folidol. In all 328 kgs. of Savin, and 950 kgs. of BHC were used respectively on 37 acres by the selected cultivators. Thus, on an average the sample cultivators used 8.86 kgs. of Savin and 25.67 kgs. of BHC per acre. The selected cultivators used 520.27 ml. of Endrin, 240.54 ml. of Dimicron and 5 40 ml. of Folidol respectively per acre. It was also observed that almost all the cultivators used one or the other plant protection chemicals to control pests and diseases.

Regarding the labour input the sample cultivators used 56.19 mandays of human labour and 14.39 bullock days of bullock labour per acre. Out of the total 56.19 mandays about 39.62 mandays were contributed by the men labour and the remaining 16.37 mandays were contributed by women labour.

Yield :

The selected cultivators obtained 40650 kgs. of Kapas from 37 acres. Thus on an average the cultivators harvested about 1098.64 kgs. of Kapas from the cultivation of an acre of hybrid-4 cotton. The expected yield was 1400 kgs. to 1600 kgs. per acre. However, the yield obtained by the sample farmers is low and it was 1098.64 kgs. This reduction in yield may be attributed to the fact that non-adoption of full package of practices by the selected culivators. According to the package of practices the recommended seed rate is 1 kg. per acre. As against this tbe selected cultivators used 1.02 kgs. per acre. Similarly, the sample cultivators used 63.27 kgs. of N, 25.75 kgs. of P_2O_5 and 28.37 kgs. of K_2O against the recommended dose of 60 : 30 : 30. In case of plant protection chemicals also, the selected cultivators did not use the recommended quantities. It is because of these reasons that the cultivators failed to harvest the expected yield of 15 to 16 quintals.

Cost return relationship :

Only the variable costs like cost of seed, manures and fertilisers, plant protection chemicals, labour charges and the irrigation charges etc., are considered for the analysis. The fixed costs are not included in the study as the data on the expenditure incurred on fixed items was not available.

It could be seen from the Table-II that the seed cost accounted for over 15% of the total cost of cultivation. On an average the sample farmers incurred an expenditureof Rs. 94.72 per acre towards the cost of seed.

The cost incurred on manure was quite less and it accounted for only about 5% (or Rs. 30.54) of the total cost. The cost incurred on fertilisers was the highest among all the inputs

kgs. of K_2O was applied per acre by the sample cultivators.

The total cost of cultivation was Rs. 624.47 per acre. Thus, the selected cultivators obtained a net income of Rs. 2067.69 per acre. This shows that the net income obtained was quite high as compared to any other crop and it is possible to further increase the net income by adopting the full package of practices.

TABLE - II

Cost of cultivation, Gross and Net income from cultivation of H_4 Cotton (commercial) in Sindhanoor Taluk of Raichur District 1972-73.

Sl. No.	Items	No. of cases	Total area (acres)	Cost incurred for the whole area (Rs.)	Cost per acre (Rs.)	Percentage to Total
1	Seed	14	37.00	3505.00	94.72	15.17
2	Manures	14	37.00	1130.00	30.54	4.89
3	Fertilisers	14	37.00	9455.00	255.54	40.92
4	Plant protection chemicals	14	37.00	2436.50	65.85	10.55
5	Labour charges (Human & bullock)	14	37.00	6024.50	162.82	26.07
6	Irrigation charges	14	37.00	525.00	15.00	2.40
7	Total cost of cultivation	14	37.00	23076.00	624.47	100.00
8	Gross income	14	37.00	99610.00	2692.16	—
9	Net income	14	37.00	76534.00	2067.69	—

2) The nature and role of people's 'Needs' in Extension Program Development

By S. Munegowda A.A.O., Bangalore.

Introduction:

Man is an independent living system, surrounded by an environment with which he constantly inter-relates. His well being depends on keeping a balance between internal forces produced by energy and external conditions produced by the environment. To keep the system in equilibrium it is necessary that certain "needs" be met. In this sense every person is continually meeting his needs–trying to attain those conditions of living that make for satisfaction. He is constantly attempting to attain, maintain or improve his balance. Man has needs to the extent that the relationship becomes out of balance. The nature and extent of the needs depends on the nature and the extent of imbalance. This is the source from which all people's needs emerge.

The needs of an animal are all fixed. The needs of man are all not fixed. Only some of them are so fixed, while others are variable in accordance with a large variety of external conditions. Variations in social structure will change some needs or create new ones. Man's attempt to attain and maintain an equilibrium between internal and external forces, represents in true form his real struggle for survival and improvement econmically, socially, aesthetically and morally.

Meaning of 'Needs':

Paul Leagans, defines the need as the difference between what is and what ought to be.

Needs always implies a gap between these two conditions.

What ought to be

Gap | Need

What is

Classification of Needs:

According to Abram Kardiner, needs are of either a bodily nature or created or accentuated by the society. Hunger and sexual needs are probably the most basic needs of man. These are apparently somatically rooted. Other needs, like the need for production, are not somatically rooted, but are not therefore, less urgent. It is the characteristic of man that his needs are not stereotyped and change under different conditions.

According Paul Leagns, the needs of people may be classified according to different forms and categories, one may use such terms as biological needs, educational needs, human needs, derived needs, particular needs, social needs, individual needs and so on. For simplicity and practical purposes, however, the needs of people may usefully be classified into three categories :

1) *Physical needs :* Food, clothing, housing activity and the like.

2) *Social needs :* Group status, affection, belonging, etc.

3) *Integrative needs :* The need to relate one self to something larger and beyond oneself, a philosophy of life, etc.

Paul Leagns, says that from a psychological stand point, needs may be classified into two groups viz., felt or consciously recognised needs and unfelt or unrecognised needs. Regardless of the classification used for studying needs it should be recognised that in a free society, all needs must become felt before they serve as motivating forces. Research in adult education indicates that adults often are not aware of many of their most important needs. To the extent of that this is true, adults have needs which are unfelt. Significant needs of which people are, not conscious must be ferrated out and met in order to help them advance towards more desirable economic and social conditions.

According to Arthur Niehoff, needs which influence local level change projects can be sub-divided into four categories :

Demonstrated felt need :

A need which has been demonstrated by the recipients in their prior attempts to solve the problem on their own.

Solicited felt need :

A need which the project recipients are aware of to the extent that they solicit assistance from the change agent or local level authorities for its fulfilment.

Ascertained felt need :

A need which although already existing is only latent in the awareness of the recipients and is clarified through consultation with the change agent.

Generated need :

A need which is created through deliberate efforts of the change agent.

The concern of needs in Extension Programme Development :

Here it is necessary to understand the meaning of Extension Programme, Extension Programme planning and problem.

Extension Program :

It is defined as an understanding arrived at co-operatively by the local people and the extension staff of: (1) the situation in which people are located, 2) the real problems that are

part of the local situation, 3) the objectives of the local people in relation to these problems and 4) the recommendations to reaching these objectives.

Extension program planning :

It is defined as a continuous educational process which is a co-operative activity, involving lay people and the extension staff in which problems are identified, objectives are setforth, and the action is taken to reach the activity. It involves two major components, viz., 1 Program development 2 Program execution.

Problem :

The nature and extent of the need (width of gap) is an indication of the significance of the problem.

It is clear that the most important aspect of extension program development work is the involvement of local people in all its aspects. This is in line with extension's fundamental objective of helping people to help themselves. So local people's involvement is a must in extension program building as it is recognised as the basic philosophy involved in this work.

The entire process of extension program planning implies a need for change. Changes that are important to people are those that help them meet their needs for biological, economic, social aesthetic and moral well-being. Basically all programs exist to help people to meet their needs. If programs do not do this, people in free-choice societies will not long participate in them. Efforts to promote change in conditions in free-choice participation are successful only to the extent they are focussed on the important needs of the people and are effective in helping people meet these needs. Under voluntary conditions of participation people concern themselves, with programs of change only when they think that the program is valuable in meeting personal, family group or community needs which they themselves recognise. So the elements of people's needs becomes a central concern in program development.

The following questions give the key orientation and justification for program development :

1) What needs do people have ?
2) How can needs be identified ?
3) What plan of priority should be set up for meeting people's needs ?
4) What resources are necessary to meet people's needs ?
5) How should resources be oraganised and directed to help people meet their needs ?

What is can be determined by a study of the situation, i.e., by collecting the facts and analysing the situations. What ought to be can be determined on the basis of research findings and the values people hold. Information about what is does not make a program, it only shows the situation. From this point planners have to take another step and decide what ought to be. Deciding on what

ought to be is the process of deciding program targets, goals or objectives.

The successful extension worker relates the needs which he sees for rural life to the desires and wants of the people. These desires and wants of the people's objectives can be changed by educational process initiated by extension workers. It is essential to reach working objectives through full discussion.

Before deciding on objectives, it is necessary to find out the base of a need. Without the base of need the program objective cannot be decided. Even needs themselves will not give objectives. Needs along with the possible solutions to solve the needs makes program objective. By contacting the people and contemporary life and discussing with them *what is* can be traced. By contacting the specialists and deciples, and discussing with them what ought to be can be traced. Then what should be can be decided.

Conclusion :

Program development is a function of democracy. The process of involving right people in program building is an educational experience, and the basic philosopy. They can be encouraged to commit themselves favourably to the change. People do not partici pate in program development if there is no scope to identify their needs and help them to meet their needs. So the element of people's needs becomes a central concern in program development.

Selected referenees :

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I) Coping with the shortage of Fertilisers

Vertical growth :

"The feature of our economy lies in achieving a vertical growth in productivity both in plant and animal products. We have, for example, about the same area as the United States under cereal crops, and if we attain the yield level as American farmers, our annual cereal production would be about 230 million tons and not just over 100 million tons as at present".

"There has to be a qualitative change in our farming technology, and it is in this context that the fertiliser shortage is unfourtunate. In 1970 the availability was about 3 million tons of nutrients, but what will happen in the next one or two years nobody can predict owing to international uncertainities".

Better seed :

"Of course the superiority becomes greater if you have a large supply of inputs. Even if you supply 20 kgs. of nitrogen in a scientific manner high yielding varieties of rice and wheat will give higher yields than local varieties since other limiting factors like lodging are eliminated.

So we must at least improve our seed production machinery immediately, so that good, quality, disease free, seed is made available to farmers for covering large areas.

I would therefore say that priority number one is the supply of improved and healthy seed to farmers. Since we do not need scarce commodities like cement or steel for producing good quality seed there is no excuse for not attending to this work.

The second component of the strategy is to improve the efficiency of fertiliser use. On an average we now get 9 to 10 kg. of grain for 1 kg. of nitrogen. This is rather low. We should step it up to at least 15 kg. of grain.

Minikit shows .

In minikit demonstration conducted last year in rice 20 to 50 kg. of grain was produced with this amount of nitrogen in farmers' fields. These are called management minikit demonstrations, showing how to manage the rice crop. The message and methods of scientific management of small holdings will have to be spread speedily.

This will require a whole series of steps like the split application of fertiliser (in several doses), its placement and time of application, control of weeds which take away a large part of applied nutrients, pest control, harvesting, post - harvest operations and so on.

In a way, the fertiliser scarcity could be a blessing in the long run if as a result greater attention is paid to adopting efficient and economical methods of using this very potent, but very expensive, input.

Leguminous crops :

The third component of the strategy is to introduce in every cropping system leguminous plants which can fix nitrogen from the air in the soil. Grain legumes called pulses or fodder legumes like alfalfa, berseem and various kinds of clovers should find a place in every crop rotation.

In fact Australia, which has one of the highest average yields of rice, cultivates this cereal in rotation with clover. A good crop of alfalfa could add over 100 kg. of nitrogen per hectare to the soil. Similarly pulse crops and oil-cum-protein crops like Soyabean and groundnut would also enrich the soil.

"Our animal production programmes are suffering because of lack of nutritious fodder. So the practice of introducing a leguminous fodder plant in crop rotation will again represent a long-term advantage to agriculture.

Organic sources :

The next important component of the nutrient supply strategy is to collect and conserve all organic sources of nitrogen to replenish soil fertility. We have long been talking of cowdung as manure, but unfortunately until the fuel supply problem is solved, it will not be possible for many of our rural families to use cowdung for this purpose. Both urine and cattle shed washings can be used effectively.

We generally tend to underestimate the tremendous contribution that can be made through many small steps. At least the energy crisis should result in our not being so improvident about waste disposal.

Greenleaf Programme :

This would be useful in years of drought when crop failures are extensive. If you have additional quantities of fertiliser, higher doses could be given in irrigated areas. Production in irrigated areas can thus be stepped up to compensate to some extent for the loss in production in unirrigated areas.

If minimum world fertiliser security is assured and if the oil-rich nations were to supply Petroleum for food production at a concessional rate, this would be very helpful in producing more food and avoiding the possibility of widespread famines.

We have to organise a nationwide greenleaf manuring programme. We

have already requested State Farms Corporation of India and the agricultural Universities to multiply seed of these leguminous shrubs because they may not be available through state departments of agriculture.

What we need is concerted effort to gather all the seed and have a concrete programme for greenleaf manuring. Because without seeds nobody can take up a programme for planting leguminous shrubs and trees on an extensive scale.

Excerpts of the views expressed by Dr. M. S. Swaminathan

Source : Farm Fare, Vol. 1, No. 2, February, 1974.

2) Fertiliser is a component and not a substitute for good management

The scarcity of fertilizers in Indian agriculture is by itself the reflection of the credibility of high yielding varieties. One should not brush aside with complacency the view that the scarcity would be a passing phase. Rationalisation of use of fertilisers, erasure of the imaginary link between high-yielding varieties and high levels of fertilisation and promotion of management practices which favourably interact with fertilisation-are the only methods by which to sustain the high yielding variety programme and to ensure stable high levels of production.

Need for proper understanding :

Dwarf rice varieties are distinctive for their high yield potential and for high responsiveness to fertilisers. The latter of the attributes, unfortunately, has been over emphasized in the early days in order to establish a good credibility for High Yielding Varieties (HYV) Programmes. It is, therefore accidental that heavy fertilisation and HYV got inadvertently linked in the communication-although from the early days of research with dwarf rice varieties, it has been clearly established that dwarf varieties outyield the locals at all levels of management. The farmer does not, therefore suffer loss in yield by preferring a dwarf variety even when he has no access to fertilizers.

Importance of Efficient Management Practices :

It is erroneous to expect that a good variety plus abundant supply of fertiliser will result in a high level of production. A wide scatter of yields realised in the same environment is clear refutation of such an expectation. In the spread of high-yielding varieties, greater emphasis is given to rates (level) of fertiliser application rather than the critical elements of

management which permit an efficient use of added fertiliser and of native fertility in order to provide higher yields. For example, the age of seedlings, depth of transplantation, top-dressing the fertiliser on drained field are not emphasized while the "recommended dose of fertiliser" is stated as "required". In fact, it is possible to bring about 69% increase in yield just by improved management practices. Thus, a farmer who adopts a new variety as well as high levels of fertilization, but neglect the management practices stands to lose about 4 tonnes per hectare. In this regard, the results of a good management on yields are shown in the Table appended to this article.

Application of Nitrogen :

The rates of fertilization would naturally be guided by the magnitude of response. Poor plant type varieties do not stand high rates of fertilization and even at moderate N-levels (20-50 kgs. N/ha), the response is of the order of 15 kgs. of grain per kg. N as opposed to the dwarf good plant type varieties with nearly double the response. Since dwarf rice varieties keep on responding even beyond 100 kg. of N/ha, it has become customary to recommend and practice higher rates; overlooking the fact that management of added fertilizer and associated cultural practices are even more important than the rate of N fertilization adopted.

The choice of varieties (dwarf high-yielding) which respond to fertilizers and of practices which interact favourably with the chosen level of fertilization would, mainly constitute the primary strategy to more effectively use this scarce and costly cash input.

Tests with Dwarf varieties :

Multi locational data on N-response of dwarf rice varieties grown under graded levels of Nitrogen (0–200 kgs. N/ha) bring out the wisdom of management of dwarf varieties at moderate levels of fertilization until other skills in management of these varieties are perfected. The grain yield data from several Nitrogen variety trials conducted with some dwarf varieties over several seasons, when summarised, indicate that under moderate 'N' level no more than 20% yield is sacrificed provided management practices have been adequate. In otherwords 30 to 50% of N fertilizer applied is contributing to 80% of the grain yield. The appropriateness of adapting moderate fertilizer dose to dwarf rice varieties would thus be self evident.

With some exceptional locations and level of native nitrogen, most of the places where trials have been conducted show that application of Nitrogen over 50 kgs./ha is not that profitable for HYV. Even in places where application over 50 kg./ha. could prove to be profitable, the farmer who is faced with shortage of fertilizer would be well advised to curtail the rate of 'N' fertilization and concentrate on improving management practices.

Norms of Crop Growth :

The norm state of crop is best determined by the density of tillering

in vegetative stage, since the loss in tillers hardly compensated by better management during ripening period. It is therefore, essential that every management practice be utilised for the promotion of tillering which is strongly correlated with yield. Close spacing of young seedlings, shallow planting, maintenance of a thin film of water during tillering period, efficient nitrogen management and avoidance of nutritional deficiencies of zinc and phosphorus are all aimed at securing a good density of tillering and thus a Leaf Area Index (LAI) beyond the critical limit. These practices assume special significance when the level of fertilization is low and/or when the climatic environment is not favourable.

Crop management at moderate 'N' level:

The choice of high-yielding dwarf varieties is inescapable. Even among dwarfs, a variety with the highest yield potential is to be chosen if the objective is to make more efficient use of a moderate level applied fertiliser. The varieties of 130 day duration exhibit the highest yield potential and hence wherever possible, the choice should be from this group such as – Jaya, Sona (IET-1991), etc. If the duration of 130 days is unrealistic for other reasons, the variety with the next highest yield potential of appropriate duration group should be chosen, e. g., 150 to 160 days Jagannath, 140 to 150 days Vijaya, 130 to 140 days Jayanti (IET 1039), IR-8, 125 to 130 days Jaya, Sona (IET 1991), 115 to 120 days Ratna, IR–20, 100 to 110 days Cauvery, Bala.

Close spacing of seedlings preferably with young seedlings of 4 to 6 leaf stage and shallow planting are essential. While the dwarf varieties, in general perform equally well over a wide range of spacing of 10 cm. x 10cm. to 30 cm. x 30 cm., it is essential to plant as close as possible (say, 10 cm. x 15 cm.) under moderate 'N' level management. Close spacing ensures adequate density of tillers, leads to a better exploitation of native fertility and ensures a good root spread to maximise the nutrient uptake and minimise the losses of added fertiliser.

No basal fertilisation is necessary when the high yielding variety is programmed to be managed under moderate N-level. In situations where severe phosphorus or zinc deficiency is noticed or expected, the basal application of these could be practised to correct those deficiencies. Basal application of N-fertiliser runs the risk of losses since the nutrient uptake in transplanted rice does not accelerate until 2–3 weeks after planting and during this period, losses of added N-fertiliser could be considerable.

A single top dressing with 40 to 50 kg. N/ha either as urea, Ammonium Sulphate or even Amophos should be given approximately 40 days before flowering which would be approximately 30 to 35 days after planting for variety of Jaya and Sona duration; and 20 to 25 days after planting for a

variety of Ratna duration. By the time the top dressing is programmed, the crop would have fully drawn up native fertility and might develop a slight pale colour, but the crop would have developed a good root system so as to absorb most of the added N-fertilizer. Inthe experiment conducted at AICRIP on moderate N-management, it has been possible to secure over 70 kgs. grain/kg. N, for the variety Sona and over 50 kgs. grain/kg. N for the variety IR 20–when 40 kgs. N was given as a single top dressing 40 days prior to flowering. Similar application earlier and later to this stage are not efficient. With a single top dressing in mid–tillering phase, the efficiency of N fertilizer has has been nearly doubled and hence despite reduction in rate of nitrogen applied, a good yield level has been maintained.

(Extracts from Dr. S. V. S. Shastry's paper presented at the meeting of the task force for improvement of the efficiency of use of fertilizer in different crops, ICAR, New Delhi on September 21st 1973).

Grain yields (kg./ha) of Sona (IET 1991) under different Management levels, AICRIP, Rabi 1972.

Treatment	Grain yield (kg./ha)	% increase in yield over control
Old seedlings ; deep planting ; Wide spacing-CONTROL	6046	—
YOUNG SEEDLINGS ; deep planting ; wide spacing.	6943	15
Old seedlings ; SHALLOW PLANTING ; wide spacing.	7791	29
Old seedlings ; SHALLOW PLANTINGS ; CLOSE SPACING.	8255	37
YOUNG SEEDLING ; SHALLOW PLANTING ; wide spacing.	9033	50
YOUNG SEEDLINGS ; SHALLOW PLATING ; CLOSE SPACING.	10193	69

Soucre : "Spic" Farm News, Vol. II No. 1 January 1974

3) The grubbiest grub going

Root grubs, or white grubs are one of the major pests of crops not in our State but throughout the country. Wherever they occur, they cause upto hundred percent damage by feeding on the roots. There has been no report of any crop being completely resistant to this pest.

Eat anything :

In Mysore State, root grubs are

widespread and cause severe damage to nearly all crops. In the districts of Mysore, Bangalore, Kolar, Tumkur, these have been found damaging vegetables, cereals, millets, ground-nut, ornamental plants, including roses, lawns and Sugarcane among others. In Bellary and Raichur districts they have become the major pest on Sugarcane. In the northern districts of the State widespread damage is done to cereals, millets and tobacco. In all the areca growing tracks of Malnad including North Kanara, Shimoga, Mangalore and parts of Chickmagalur, they feed on Areca roots and are responsible for reduced yield sometimes even causing death to the plant. Coffee plantations in the districts of Coorg, Hassan and Chickmagalur and Mysore suffer heavy loss due to this pest.

There are two types of damages due to this pest. First one, is due to adults which appear immediately after the first rains in April and May. The adults feed on the foliage of different plants. Except in a few places and on a few plants like roses and grape, the damage due to the adult is not severe compared to that of the grub. The larvae or young one of these beetles, known as root grubs or white grubs are the real threat to agriculture. Their main season is from June to December, depending upon the places. They are subterranean and feed on any roots available to them including weeds.

........**And spares nothing**:

The root grubs or white grubs belong to mainly the two families of beetles, the Melolonthidae and Rutelidae. There are several species of beetles whose larvae are root feeders. The one most commonly occuring and widely distributed is *Hologrichia serrata*. The adult is about 22 to 25 mm long, reddish brown, elytra mostly tomentoses, Prothoracic sides serrated, clypeus bent up. Adults feed on more than 20 host plants but the preferred host is Neem. *(Azadirachta indica)*.

At times the adult damages a grape vine cutting even 1/18" thick and feeds on leaves. It also defoliates roses, apple, peach plum, guava etc., The grubs feed on roots and they have become endemic in certain parts of the State including Kollegal, Chamarajanagar area of Mysore districts, Hoskote, Devanahalli, Sidlaghatta, Melur of Bangalore and Kolar districts, Hospet and Thungabhadra Project areas of Bellary and Raichur and areas of Belgaum districts, but whatever crop grows in these areas during June - December there will be heavy loss.

Lives it up:

The adults emerge after the first rains in April, between 7-30 and 8-30 p.m., remain active throughout night, feed, mate and go back to soil before dawn. They lay eggs individually in earthen cells at the depths ranging from 10 to 15 cm in the soil. Egg laying is completed before the end of May. The newly hatched grubs, white in colour with reddish brown head, can live on

organic matter present in the soil, but are capable of damaging roots where-ever they are available.

After about a month of emergence from eggs, they go in search of live roots, when they become real problem for the plants. During July they reach 30 to 40 mm in length and thereafter they become active root feeders. They continue to damage till November–December, when they start pupating.

Pupation will take place in earthen cells in the soil at depths ranging from 20 to 40 cm. The pupal period lasts for 12 to 14 days by which time adults are formed. The adults remain in the earthen cells inside the soil till the first rains in April after which they come out of the soil, feed and mate during night and go back to lay eggs inside the soil. Thus another life cycle begins.

The insect completes one life cycle a year.

In the event of failure of rains between June & September, the grubs stop their activities, constructs earthen cells and go into a sort of hibernation till the weather is favourable.

How to foresee the damage due to root grubs :

1 The most important point to bear in mind is to recognise the previous year's infestation. Unless it is fully eradicated, the root grub problem is sure to be there in the next season.

2 In the infested area keep a watch for the adult emergence immediately after the first rains (during April-May). The beetles emerge from the soil in the evening after 7 p.m. making a buzzing noise which can be recognised even in the dark.

3 Keep a watch over such trees like Neem, Pithacalobium, Jambolana, Apple, Drumstick, Roses, Peach, Pear, Pipal tree, Cassia, etc., around infested field on which the adults invariably feed and mate. Under such trees, large number of black small pellets could be seen in the morning. The top and peripheral branches of the tree are left defoliated due to feeding by beetles. Neem is particularly preferred by Holotrichia Serrata.

4 The day after the first rain, a number of holes, the diameter of which is equal to the little finger can be seen in the infested field indicating the emergence of beetle. The number of holes indicates the severity of the problem.

Control measures :

(Item No. 1 or 2 may go with any one items 3, 4 and 5).

1 In limited areas like lawn, kitchen garden etc., the adult beetles (holotri–chia) could be collected and killed by hand with the help of patromax light in the evenings between 7–15 and 8-30 p.m. immediately after the rains in April. If this method is followed regularly for two weeks after the rains in April–May all the adult beetle could be collected and destroyed before they lay eggs.

2 Wherever the host plants menti–oned above like neem roses, apple are present etc., in the vicinity of infested

field such trees may be sprayed with parathion 0.2 % or carbaryl 0.2 % immediately after the first rains, either on the same day or next day, so that all the adult that come to feed and mate may be killed.

3 Wherever irrigation facilities are available flooding and puddling during June–September will give hundred per cent control.

4 Repeated ploughing 10 to 12 times in June will reduce the pest below economic level.

5 Application of 8 to 10 kgs. of phorate, 12 kgs. of Disystan granules 5% or 10 kgs. Furadon 3% or 10 kgs. Ekalux 5% per acre in the first week of June uniformly all over the infested field and working it into the soil before sowing controls the pest.

6 Deep ploughing in December-January will kill all the beetles lying inside the earthen cells and reduce the pest for the coming season.

Watch it :

It would be difficult to control the pest satisfactorily under the standing crop, even at higher dosage of insecticides.

Application of chemicals may not give satisfactory results if applied later than June.

G. K. Veeresh, Asst. Professor of Entomology, U.A.S., Bangalore

Source : Kisan World Vol. 1 No. 2 February 1974.

VI Research News

1. Intan variety of paddy is suitable for parboiling :

The paddy variety INTAN is a blast resistant, semi-dwarf introduction and the performance of this variety in Malnad is encouraging and a note has already been published in the Current Research of March 1973 on this variety. Cooking quality of this variety is evaluated by CFTRI is as follows :

> It is a fine grade variety with fairly good milling quality.
> Cooking quality does not compare with that of indigenous indica varieties. The rice sample even after 4-5 months after harvesting cooks to a pasty product which would not be to the liking of people accustomed to raw rice.
>
> For parboling, this variety of rice is considered suitable and can be recommended. As the variety is slightly glutinous, we feel that even after parboiling it would give a rice which in cooking quality, would be intermediate between raw and parboiled rice and could therefore be suitable for popularising even among raw rice eaters.

2 Early, day neutral Horse-Gram cultures with high yield potential :

Horse-gram is one of the extensively grown pulse crops of Karnataka. It occupies an area of about 5 lakh hectares i.e., more than 40% of the total area under pulses. It is an highly drought tolerant crop and is generally grown as an entire crop in poor light red soils where no other crops could be successfully grown. It is also grown as a mixed crop in Ragi, Cotton, Niger, Grondnut, Jowar etc. It is grown as a 'rabi' crop after kharif paddy,

In the course of a study of the germplasm of this crop representing areas all over India, it was observed that the germ-plasm consisted of a few early cultures with determinate habit and maturing before 90 days. They were sown in the summer of 1972 to know their yield potential. Twelve cultures were sown in plots of the dimension 3 m x 1.8 m. The design adopted was the RBD with 4 replications. Each plot consisted of 6 rows each spaced at 30 cm. distance. Within the row, the spacing was kept at 5 to 7 cm. A basal dose of 20 : 12 : 0 N:P:K per hectare was applied at the time of sowing. Data on yield maturity and seed colour are presented in the note.

A perusal of Table-I shows a significant difference between the eleven varieties in their yielding ability. The two cultures PLKU-15 and EC-7460

with high yields have a black brown mottle beans and may not be preferred in the market. The third ranking culture PLKU-32 has an acceptable seed colour and also comparatively early. The beans of this culture are the boldest amongst the eleven cultures. The check (Bailhongal) variety being photosensitive did not flower in summer and hence no yield could be obtained. Farmers grow local cultures of horse gram and no early improved variety has been recommended for extensive cultivation. Most of the local types and the few varieties recommended are photosensitive and flower only in October-November period. They are also late types with a duration extending upto 140 days. They grow into a thick bush being prominently tendrilate and highly indeterminate in their growth. The yield obtained is very low. Early cultures with determinate habit and day-neutral behaviour will be advantageous in fitting into double cropping pattern for rainfed areas. There is good possibility that the selection PLKU-32 can be grown either in early kharif before ragi, groundnut or jowar or after them as a late kharif crop and also as a catch crop in paddy fallows.

TABLE–I

Yield maturity and seed colour of early horse-gram cultures.

Cultures		Yield q/ha	Maturity (in days)	Seed colour
1	PLKU–15	23.1	92	Black brown mottle
2	EC-7460	22.2	91	,,
3	PLKU–32	18.3	86	Red brown light brown mottle.
4	IC-9626	17.7	87	Black brown mottle.
5	EC-18543	16.3	84	,,
6	PLKU-7	15.9	90	,,
7	Variety late	13.5	89	,,
8	IC–9623	12.9	90	,,
9	IC-9620	11.7	91	,,
10	Mecharishor T_3	11.1	113	White brown mottle.
11	IC-8906	9.6	94	Black brown mottle.
12	Bailhongal	Did not flower	—	Chacolate brown.

C.D. 9.0
Significant at 5% level

3. IR-8 paddy straw is not harmful :

It was reported as a new item that a new disease characterized by the symptoms of gangrenous ear tips and tail tips, occured in the buffalo in Punjab State. This was attributed to feeding animals with IR-8 paddy straw. The symptoms narrated therein indicated the possibility of chronic ergot

poisoning; thus it was of interest to undertake the analysis of IR–8 paddy straw samples for alkaloidal content and to compare the analytical information with that of other non–exotic varieties of straw.

Seven samples of IR–8 paddy straw secured from different paddy research stations under the control of University of Agricultural Sciences were analysed; alkaloidal extracts were made. All the seven IR–8 paddy straw samples were found to contain an alkaloid; however in none of the samples the alkaloid isolated gave positive reaction for ergot tests.

Five varieties of paddy straw (PTB-20, PTB–28, PTB-9, Kothambri and Sannakki, nonexotic varieties) were also similarly anylysed; all the five samples examined showed the presence of on alkaloid and proved negative for ergot content.

Oridine, an alkaloid has been reported to be present in rice. It may therefore be inferred that all varieties of paddy straw including IR-8 paddy straw contain an alkaloid, perhaps, akin to oridine and the presence of this alkaloid may not be detrimental to the health of animals. However, it is probable that animals fed with paddy straw contaminated with ergot producing mould may present such pathological changes as were noted in animals reported to have suffered from the disease outlined above.

Source: Current Research No. 2, Feb. '74, U.A.S., Hebbal.

VII News in breif

1 Raichur district bags III Prize in the All India Level Paddy Crop competition:

Shri K. Poornachandra Rao of Mudlapur village in Manvi taluk of Raichur district has secured III place in the All India Paddy Crop Competition held during 1973–74. He has obtained 12,956 kgs. of grains per hectare. The 1st and 2nd prize winners namely Shri Shankar Krishna Pawar and Shri Maruti Ganapathi Patil of Maharashtra State have harvested yields of 17,772 kgs. and 16,126 kgs. respectively. The 1st prize winner will receive Rs. 3000/– along with the certificate of "Krishi Pundit" in appreciation of his outstanding achievement, while the 2nd prize winner will receive Rs. 1200/–. The 3rd prize winner will receive Rs. 800. The prizes will be presented at a function to be held at New Delhi during the year.

2 Joint Meeting of the Officers of the Department of Agriculture and Scientists of the University of Agricultural Sciences to finalise package of practices for 1974.

A joint meeting of the Officers of the Department of Agriculture and Scientists of the University of Agricultural Sciences was held recently at the Hebbal campus to finalise the package of practices for different crops for the year1974. The publication, this year includes Soyabean, Field bean and Horsegram.

3 Congress Exhibition:

The Departmental stall in the Congress Exhibiton continued to draw large crowds. The Governor of the State His Excellency, Sri Mohanlal Sukhadia was was one of the distinguished visitors to the pavilion.

4 All India Level Sugarcane Crop Competition 1972-73–Declaration of results:

The results of the All India Level Sugarcane Crop Competition for the year 1972-73 were announced recently by the Directorate of Sugarcane Development, New Delhi. The best yield for Eksali crop has been taken by one Shri R. V. G. K. Rao of Andhra Pradesh who bags the 1st prize for the Southern Region with a production of 361.90 tons per hectare using Co 62175. The best yield for short duration has been taken by Sri Vijaya Kumar of Maharashtra who gets the 1st prize for short duration in southern region with a production of 310.50 tons per hectare using Co. 740. In Adsali Sri Vishnu of Maharashtra using Co. 740 has produced 418.90 tonnes per hectare. He gets the 1st prize for Adsali Sugarcane in the southern region.

VIII DEPARTMENTAL NEWS :

a) Director's Tour

The Director of Agriculture held discussions at Mandya on 2-2-74 with the Japanese leaders of Indo-Japanese Agricultural Extension Training Centre and Deputy Director of Agriculture, Mandya with regard to problems facing in the construction of hostel for the trainees and also quarters for the newly posted Engineer. He also held discussions with the Deputy Director of Agriculture (R.D.T.C.) Mandya about the budget provision for that training centre for the year 1974-75. He proceeded to Srirangapatna on 3-2-74 to inspect the fields infested with red ants and gave instructions to the officials to take up plant protection measures immediately. He was in Madras on 14-3-74 to attend the meeting with regard to implementation of V Five Year Plan proposals. He accompanied the Hon'ble Minister for Agriculture to New Delhi on 23-2-74 and attended the meeting convened to consider the Agricultural Development programmes included in V Plan. He left New Delhi for Punjab on 25-2-74 and visited Hissar Cattle Farm. He left New Delhi for Bangalore on 27-2-74.

b) Promotions and transfers : *Nil.*

c) Schemes : *Nil.*

d) Publications, Extension materials and Radio Talks :

Fortnightly seasonal tips for the benefit of the farmers in the State for the month of February, 1974 were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme "Krishi Ranga".

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On the farm front

Volume-8 April 1974 May No. 4 and 5

FARM ADVISORY AND EXTENSION SERVICES

IN THIS ISSUE

Cover Page :

April - May are the months most ideally suited for taking up sowings of Hybrid Jowar under rainfed condition in the State.

It is heartening to note that despite fertilizer shortage, the overall achievement on the agricultural front during the year 1973–74 was quite satisfactory.

Food grain production which plumeted to an all time low during 1972–73, took a big leap to 62 lakh tonnes (anticipated) during 1973–74, registering a surplus of nearly 7.5 lakh tonnes over the State's requirement of 54.5 lakh tonnes. The surplus in the case of cereals is about 12 lakh tonnes which is offset by a deficit to the tune of 4.65 lakh tonnes in the case of pulses and the net surplus on account of this factor, has got reduced to 7.35 lakh tonnes. The same trend was seen in the case of commercial crops also. The department could therefore be rightly proud that its efforts have really started paying off.

This claim may probably look strange in the context of the galloping prices. But the price factor, as everyone knows, is a different phenomenon which operates on an all India pattern, often in tune with the international prices. Speaking about India and Karnataka, the year 1973–74, had to absorb the shocks and pressures of the crisis year of 1972–73 with its widespread prevalence of droughts and the massive food aid. A good harvest again during 1974–75, it is hoped, will certainly improve the lots of the people in the State.

The department has drawn up the annual programme for 1974–75 which forms the First Year of the V plan. The constraints of fertiliser still loom large on the scene although some improvements may be discernible in recent months. Given a good weather, our farmers are bound to make more determined efforts and achieve better progress than before, inspite of the above constraints. The extension staff have therefore to play a vital role to educate and convince the farmers as to how the scarce inputs can be economically and advantageously used in lesser doses to give better results.

A food grain production of 64 lakh tonnes has been aimed for 1974–75. A coverage of 2.65 lakh hects. under Hy. Jowar, 2.95 lakh hects. under High yielding Paddy, 1.22 lakh hects. under Hy. Maize, 0.99 lakh hects. under Bajra and 0.64 lakh hects under Mexican wheat and in all 8.45 lakh hects

under the High Yielding Varieties Programme, has been chalked out.

A great responsibillty is cast on the Extension worker not only to achieve this target but also to see that the necessary production requisites are made available to the farmer to help him reach the goals of production.

I hope every one in the line realises this paramount need of the hour.

Dr. H. L. Kulkarny
Director of Agriculture

II How the previous month was

(Seasonal and crop conditions during March 1974)

The weather was mainly dry and hot. There were no reports of rainfall from any of the districts. Sowing of hybrid maize, top dressing of summer paddy, preparation of land for sowing of early kharif crops, were some of the important agricultural operations carried out. The agricultural situation in brief for each division is given below in brief.

Bangalore division :

Weather was mainly dry. Temperature both during day and night was above the normal. Sowing of hybrid maize and sunflower, transplanting of paddy and ragi, top dressing of paddy, ragi and hybrid maize, threshing of rabi jowar, were some of the important agricultural operations carried out. Due to continuous dry spell in Kolar district, Summer paddy was withering. There was minor incidence of leaf miner on groundnut, stem borer on hybrid jowar and hybrid maize and case worm on paddy. Necessary control measures were taken up.

Mysore division :

Dry and hot weather prevailed. Important agricultural operations carried out were, transplanting of paddy and ragi, intercultural operations in paddy, ragi, hybrid jowar, hybrid maize, harvesting of sugarcane, harvesting of rabi crops like Mexican wheat, pulses, raising of tobacco nurseries, preparatory cultivation operations for sowing early kharif crops and sowing of green manure crops. Blast, stemborer, case worm on paddy were noticed and for which necessary plant protection measures were taken up.

Belgaum division :

Weather was mainly dry and hot. Planting of sugarcane, sowing of hybrid maize and hybrid jowar, picking of cotton, harvesting and threshing of rabi jowar, tur and safflower, top dressing of summer paddy were some of the major agricultural operations carried out. Pod borer on pulses, flea beetle and stemborer on hybrid jowar, shootborer on sugarcane, blast and leaf rollers on paddy were noticed. Necessary plant protection measures were taken up to bring the pest and disease attack under control.

Gulbarga division :

Dry and hot weather prevailed. Important agricultural operations carried out were, harvesting of rabi

jowar, wheat and safflower, top dressing of hybrid jowar, hybrid maize, hybrid bajra and paddy, picking of cotton, harvesting of early sown groundnut crop and harvesting of sugarcane. Except for slight incidence of blast on paddy, shoot borer on hybrid jowar, leaf miner on groundnut, there were no reports of major incidence of pests and diseases.

INPUTS FOR FARMERS

a) Fertilisers :

The introduction of the card system has been postponed to 15–6–1974 as the printing work of this enormous job is taking a little more time. However, the cards are being despatched in instalments and already many of the Deputy Directors of Agriculture have taken one or two instalments. Detailed training has been imparted to the Deputy Directors of Agriculture with regard to the introduction of the card system and therefore, the time available, on account of postponement, should be made best use of by the Deputy Directors of Agriculture and the Assistant Directors of Agriculture to prepare the Agricultural Extension Officers and Village Level Workers well to launch the work immediately. Necessary ground work needed in this behalf should be completed now alone so that the Department may be well set to introduce the system as from 15-6-1974. Government have instructed the Deputy Commissioners to render the necessary assistance to the Department to make the scheme successful. The Deputy Directors of Agriculture are therefore requested to seek the required help if and when needed.

There are likely to be complaints with regard to bogus cards, wrong entries, non supply of fertilisers by certain farmers. The Deputy Directors of Agriculture and Assistant Directors of Agriculture should keep vigilant watch and take stringent action to effectively deal with such situations.

Supplemental instructions with regard to introduction of card system have been issued by the department. The District staff should therefore carefully go through these instructions and act accordingly.

Levy incentive withdrawn :

The incentives of fertilisers to farmers who discharge their levy quota of food grains have been withdrawn in view of extreme shortage of fertilisers. Government have, however, validated all action taken under the said item and all incentives granted and received till the issue of the Government order. No further incentives are permitted from 9-4-1974.

Programme of fertiliser supply during 74-75 :

The programme of fertiliser supply during 74–75 is to obtain ; 1,80,000 tonnes of N, 75,000 tonnes of P and 60,000 tonnes of K. The Government of India have so far alloted 64,242 tonnes of N, 28,095 tonnes of P and 22,005 tonnes of K during kharif 1974. The supply position is showing a slight improve-

ment and it is hoped that the State would be able to substantially meet kharif requirements.

Seeds :

The targetted programme for hybrid jowar during current kharif is of the order of 4 lakh hectares as against 2.27 lakh hects. in the previous years. In view of the current shortage of hybrid jowar seeds, it is proposed to utilise the produce of the current summer for the kharif sowings. It is expected that harvesting of hybrid jowar seed plots will commence from the end of April 74 and will continue for a month. Arrangements have been made through Agro-seeds Corporation and Karnataka Seed Co-operative Marketing Federation to process the seeds quickly so that the seed will be ready for distribution by end of May, 1974. This is the critical period wherein all the Extension staff should be active to see that the seed produced in their area is harvested, moved to processing units, processed and bagged quickly, so that the entire quantity of seed produced will be made available in the districts in time, before the onset of sowing season. A plan for the supply and movement of hybrid seeds to various districts and the period at which it will be moved has been tentatively drawn, taking into consideration the probable sowing time in the districts.

There is a feeling amongst the cultivators that hybrid jowar seed is in short supply and they may not get seeds in time. The National Seeds Corporation has already issued press notes in daily news papers, communicating the farmers that sufficient quantity of seeds will be supplied to them at the reasonable rate of Rs. 8 per kg. The Karnataka Seeds Co-operative Marketing Federation and Karnataka Agro-Seeds Corporation have also agreed to stick to the plan drawn for movement of seed. It is likely that some of the traders may try to lift the seeds from the produce that become available early and try to send them to other States as the neighbouring states like Maharashtra and Andhra Pradesh are in short supply of hybrid jowar seeds. This should be discouraged so that seed may not go to wrong hands.

Sufficient quantities of seed to meet the targetted programme will be available to the districts by the 3 agencies as per the plan drawn up. The success of the distribution of seed within the district mainly depends upon the extension staff working in the district. The extension staff may be alerted to know the requirement of seeds thoroughly well and also to draw proper plan of distribution through the local co-operatives, Agro kendras and NSC dealers.

IV ARTICLES CONTRIBUTED BY THE DEPARTMENTAL OFFICERS

1) Combined trial on pests and diseases on paddy insecticides fenthion & Phosphomedon with fungicide, hinosan

" To study the synergistic action of hinosan in combination with the insecticides fenthion and phosphomedon in controlling paddy pests & diseases ".

By S. S. Katagihallimath, D.D.A., & N. Baburaya Nayak, A.A.O.
(Entomology), Bangalore (Entomology), Bangalore

Two field trials were carried out, one in Coondapur Subdivision (South Kanara district) and the other in Krishnarajasagar in Mysore district during Rabi season of 1973–74 with Fenthion + Hinosan and Phosphomedon+Hinosan on paddy pests and diseases. An untreated check plot was maintained in each place. These 3 treatments have been designated as follows :

T 1–Fenthion+Hinosan treatment.
T 2–Phospomedon+Hinosan treatment.
T 3–Control-untreated check plot.

The area of each treatment in each trial was 20 cents. The quantities of insecticides and fungicides used for each application for each plot of 20 cents were as follows :

1) 35 ml. of Fenthion and 35 ml. of Hinosan in 35 lts. of water.
2) 18 ml. of Phosphomedon & 35 ml. of Hinosan in 35 lts. of water.

Each plot was sprayed twice in the nursery when seedlings were 15 days old and once before lifting for transplantation and thrice in the transplanted field at an interval of 25 days.

Observations on the incidence of pests and diseases were made both before and after each application. The average incidence of pests and diseases and the grain yield are given in Table-I and II.

Conclusion :

The 2 insecticides Fenthion and Phosphomedon when combined with Hinosan are found to be effective in controlling both pests and diseases on paddy as can be seen from the data shown in the tables. Out of the 2 insecticides, Fenthion and phosphomedon, the former when combined with Hinosan has given better control of pests and hence better yield.

TABLE–I

Average incidence of Paddy pests and diseases before and after spraying

District : South Kanara Place : Coondapur

Sl. No.	Insects Name	Treatment No. 1		Treatment No. 2		Control	
		Pre	Post	Pre	Post	Pre	Post
1	Stemborer	4.5	3.2	4.7	3.5	13.5	14.7
2	Leaf rollers	5.5	4.0	5.7	4.0	15.7	18.0
3	Leaf Hoppers	3.0	1.2	5.5	4.5	15.5	16.2
4	Blast of paddy	10.7	7.7	10.5	8.0	21.5	20.0
5	Leaf spot	9.7	7.5	7.7	6.5	17.7	19.2
6	Grain yield	30.40 Qtls/Acre		29.80 Qtls/Acre		15.20 Qtls/acre	
7	Straw yield	56.80 ,,		55.60 ,,		26.80 ,,	

TABLE–II

District : Mysore Place : K. R. Nagar

Average incidence of paddy pests and diseases before and after spraying

Sl. No.	Insect Name	Treatment No. 1		Treatment No. 2		Control	
		Pre	Post	Pre	Post	Pre	Post
1	Jassids	8.5	7.0	10.0	8.2	19 0	15.0
2	Stemborer	1.0	0.5	1.0	0.7	2.2	1.7
3	Gundibug	—	—	—	—	—	—
4	Heliminthosporium	—	—	—	—	—	—
5	Blast	—	—	—	—	—	—

2) Technology for dry land agricultural development in Hadagali project-Dist. Bellary

M. H. Deshpande I/C D.D.A. (I.D.L.A.D.S.) Hadagali, Bellary dist.

In Karnataka State out of 10 m hect. of cultivated area nearly 6 m hectares are subject to frequent droughts and scarcity conditions. Drought and distress are being experienced in 135 taluks out of 175 taluks in the State. It is in these taluks maximum instability in Agricultural production is experienced, posing difficult problems. The Agricultural production in these areas can only be achieved through Integrated Dry Land Agricultural programmes

The break through in Agriculture which has been achived in irrigated and or assured rainfall areas through introduction of high yielding varieties, multiple cropping programmes, application of balanced fertiliser, adoption of plant protection measures etc., have to be transferred, looking to the rainfall pattern, economic status of farmers, unit of holdings and other infra structure to the vast areas under Dry Farming, so as to harvest the fruits of green revolution.

The available Dry Earming Technology and Research findings suitable to Hadagali Project area are tried in the Pilot Project since 1970-71. The farmers in the Project area have participated in the various programmes and the response and adoption are narrated hereunder for further adoption in the Dry Farming areas with similiar soil and climatic conditions in the neighbouring districts.

The rainfall pattern, as seen in the weekly average rainfall chart for 50 years indicates two peak periods suitable for cultivation of crops in both the seasons viz. Kharif and Rabi. The soils are also suited either for Kharif or Rabi or both seasons depending upon the moisture holding capacity and texture of the soil.

Cropping pattern

The following crops can be successfully grown in the Project area

Sl. No.	Name of the crop	Variety	Period of sowing
1	Hybrid Jowar	C.S.H.-1 and 302	May & June
2	Hybrid Bajra	H.B.-3	June & July
3	Groundnut	TMV2 & S. 206	May & June
4	Castor	N.P. H-1	June & September
5	Sunflower	EC 68415 EC 68414	June, July & September-Oct
6	Sateria	K-221-1 & HK 289	June to August.
7	Cotton	Jayadhar, Hampi	June to September August & September
8	Rabi Jowar	M-35-1	September & October
9	Safflower	A 300 7-13-3	September & October
10	Bengal gram	A-1 & Chaffa	October
11	Wheat	Bijaga yellow	October
12	Pulses	Improved varieties	Inter crop-mixed crop or catch crop

Double cropping:

In red loams and medium black soils it has been found practical and possible to adopt double cropping. Only short duration varieties are to be used so as to make use of both the peak periods of rainfall. The assured rainfall periods for Kharif and Rabi sowings are May June and September-October (290 mm and 269 mm) respectively.

The crops taken under double cropping are as under subject to usual rotations adopted :

KHARIF		RABI	
Crop	Variety	Crop	Varieties
1 Hybrid Jowar	CSH-1 & 302	1 Cotton	Hampi & Jayadhar
2 Hybrid Bajra	HB-3	2 Bengalgram	A-1 & Chaffa
3 Castor	Aruna	3 Safflower	A 300 & 7-13-3
4 Sateria	HK 289 K 221-1	4 Rabi Jowar	M-35-1
5 Pulses	Greengram	5 Tobbacco	S 20
6 Groundnut	TMV-2 & S 206	6 Horsegram	Local
7 Sunflower	EC 68415 EC 68414	7 Castor	Aruna
		8 Sunflowe	EC 68415 EC 68414
		9 Wheat	Bijaga-Yellow

The project farmers are adopting double cropping as against the monocropping followed hitherto in the area.

Soil Conservation:

The limiting factor under Dry Farming is the moisture held in the top soil. Hence contour bunding is a pre-requisite to conserve top soil and moisture. This is the only one programme where in all the farmers are interested. The entire area of the project is bunded.

The modified and acceptable broad based terrace is under construction in one of the blocks where the soil depth is more. This may serve as an improvement over contour bunding.

Land Levelling:

Levelling of lands in between two contourbunds is also necessary. The first step towards this is smoothening of land along contours, removing the undulations and humps. The second step is to level 1/3 area near the lower bund so as to spread the rainwater on a larger area to fecilitate uniform soaking. This ensures against moisture stress at reproductive stage of the crop. The top 2/3 area serves as contributing area. This is being demonstrated.

Water Harvesting:

The Farm Ponds at suitable sites are constructed so as to collect run off water from a catchment area of 25–40 acres. They do receive water by June-July and once again in September-October. This can be used for protective irrigation by lifting. The farmers are slowly utilising the farm pond water for irrigation.

It is also found possible to rear fish in these ponds for a period of 5-6 months and get an additional income of Rs. 150/– per pond with a minimum investment of cost of seed and collecting fish.

Inputs:

a) Seeds: As already stated above, the dry farming areas need short duration, drought tolerant and high yielding varieties of seeds. They also give room for double cropping.

b) Fertilizer: The use of balanced fertilizer, as basal dose, has become routine now. The demand is increasing every year. This is one of the sure methods to increase production.

c) Plant Protection: Timely sowing and seed treatment, minimise the occurance of pests and diseases. The chemical control measures are costly and cannot be adopted on large scale. Only dusting is practicable and adoptable by farmers, in general. Sprayings cannot be adopted on large scale for want of water.

Agriculture Implements and Plant Protection Equipment:

The bullock drawn implements like mould board ploughs, land levellers, bund farmers, seed-cum-fertilizer drills and sprayers, dusters are popularised. They are needed for increasing the efficacy of the operations in time.

Minor Irrigation:

To tap the available under ground water and to utilise the same efficiently, wells are to be sunk and sprinklers

have to be used. The under ground water survey is conducted and the wells are being sunk. Similarly sprinklers are also under supply.

Animal Husbandry Programme :

The three programmes viz. Poultry, Sheep and Dairy development, do assist the small farmers. They are getting momentum now since the loans are being sanctioned.

Contour cultivation:

The traditional method of cultivation in north-south and east-west directions, alternate years is stopped in majority of fields, taking up after contour bunding work in the area. This practice is a must to conserve moisture as well as soil. Every row acts as a small bund and checks soil and moisture erosion.

Training:

The Dry Farming technology is changing and improving. Hence, the farmers in the area are to be trained periodically. The demonstrations, field training, institutional training, study tours and film shows will have to be organised now and then to keep the farmers aware of new technology for early adoptions.

V GLEANINGS FROM OTHER JOURNALS :

1) Foliar spray for weeds

Since 1960 the Indian Agricultural Reasearch Institute has been working on fool-proof techniques of using herbicide on crop plants.

Crops grown in kharif or in the rainy season have a heavier load of weeds, and frequent hand weedings thus become necessary.

Even if only two weedings are all that is necessary the labour bill comes heavy.

Annual Grass :

Experience with various herbicides for different crops has now yielded satisfactory schedules, and here is one for use with rice.

A post emergence foliar application of Stam F-34 (propanil 35%), 21/ha in 800 litres of water, 3–4 weeks after transplantation, kills all annual grass weeds.

Drain water before spray. Let in water after two days. Do not spray on cloudy or windy days.

The cost of spray and application comes to Rs. 74/ha against Rs. 160 for two hand weedings.

Give a post-emergence foliar application of Stam F-34, one litre per ha, plus Tropotox (MCPB 40%), 0.5 litre per ha, plus 8 percent urea in 800 litres of water 3–4 weeks after seeding.

This kills all annual grass and non grass weeds.

Do not spray on cloudy or windy days.

This spray will cost you Rs. 84/ha against Rs. 160 for two hand weedings.

2) Rice Strategy - Kharif 1974

The strategy for kharif rice production in 1974 lays plenty of emphasis on management practices. This is based on a critical study of the progress made hitherto in rice production through the high yielding varieties so that the weaknesses in the earlier programme are understood better and future efforts are concentrated where they are needed most.

In rice management agronomic practices come foremost. These aim at tiller production early in the crop stage and ensure adequate filling up of grains in panicles.

Select good seed :

The use of seed of a higher specific gravity could help increase yields up to a point. For practical purposes a simple technique of rejecting seed found floating in ordinary water would get rid of all bad seed.

Use of seed sinking in water would yield healthy seedlings with better root production, which in turn establish quickly and start tiller production early. Such plants also have better chances of maturing uniformly.

Transplanting :

Grow healthy seedlings. Avoid overcrowding in nursery beds. This ensures the proper development of healthy seedlings. To be able to do this, use the optimum seed rate.

This varies from 30 kg/ha for fine grain types to 45 kg for bold grains in kharif. So much seed should be sown in a seedbed of 0.1 ha.

Give a small top dressing of nitrogen in the nursery 3-4 days before uprooting the seedling. This will increase leaf nitrogen and help establish the seedlings and start tiller production quickly.

Use the right plant population :

A stand of about 300 to 400 ear-bearing tillers per sq metre gives the best yield. Spacing and nitrogen application will have to be adjusted to suit this density.

Also take into consideration the ability of the variety to tiller and the initial fertiliser status of the soil.

Generally speaking, a spacing of 150 and 300 cm (15x10 and 30x10 cm) will give the required density with the fertiliser input.

All efforts must go into seeing that tillering is encouraged within 2–4 weeks after transplanting. Tillers produced five weeks after transplanting have little chance of producing good panicles.

Prepare the field well :

Level the puddled field with good care, cutting in corners and edges. Levelling is a part of good management which has a great effect on the establishment of seedlings and uniform tillering, and finally on crop yield.

Plant seedlings at a minimum depth :

Adopt shallow planting of seedlings. This should be 5 cm below the soil surface. This will help keep tiller buds at the base active and encourage good tiller production within a week or ten days of transplanting.

Unless you level the field well and drain it off excess water shallow planting is not possible. Deep transplanting and heavy flooding suppress the activity of tiller buds, delay tiller development and result in low tiller production.

Weed well in the beginning :

By weeding you reduce competition for nutrients. Hence weed early, especially indirect seeded rice.

Help panicle development :

Where tiller production is optimum, application of small quantities of nitrogen at panicle initiation or booting helps increase panicle weight.

Where tiller production is considered low for unavoidable reasons an additional dose of nitrogen when elongation takes place increases the number of spikelets and their filling, and thereby compensate for low tillering to some extent.

Direct seeding :

Since a direct-seeded crop is generally rainfed the emphasis is on levelling the field.

Drilling is the best method of direct seeding. Dry seed in dry soil, or pregerminated seed in puddled soil, may be drilled or dibbled with the help of a seeder or planter.

Drilling followed by beaming helps the seed to come into contact with soil moisture and thereby helps maturity. A row distance of 20 cm and a seed rate of 40 to 60 kg/ha, depending upon grain weight, gives optimum population.

Fertilisers application :

Rice has been reacting very well to nitrogen applications throughout the country. The amount of nitrogenous fertiliser to be applied depends on the initial or native fertility of the soil, the response of the crop to the fertiliser in the area, and the benefit–cost for the added fertiliser. This should be worked out for each type of land.

You may generally follow this recommendation based on all–India coordination trials.

Since kharif is considered a high-risk season because of uncertainty in monsoon conditions and buildup of pests which are difficult to control, it is necessary that you follow a benefit–cost ratio of at least 2.5 at the optimum nitrogen level.

On this basis a level of about 75 kg/ha for early and medium varieties is considered an economic optimum level on soils of normal fertility.

In areas where sunshine hours relation is very high, as in Punjab, Haryana, Western Uttar Pradesh and the southern states, or where water is assured in time, or on soils of very poor fertility, an additional 25 kg/ha of nitrogen helps.

Method and time of application :

In all-India trials over a number of years it has been seen that distinct, and sometimes spectacular, results were obtained with split application of nitrogen.

It has also been seen that the best method of top dressing nitrogen is to apply it on a moist surface, with reirrigating after a day or two.

Early rice, direct-seeded in dry condition :

While an application of 100 kg of nitrogen per ha at seeding yielded 2687 kg compared with 1705 kgunder unmanured conditions, a split application of 40 kg/ha at seeding, 20 kg at tillering and 40 kg at panicle initiation boosted the yield to 3505 kg/ha. This meant an extra yield of 8 qtl through the split application.

Basal dressing of nitrogen should however be avoided for direct-seeded rice at seeding. Nitrogen may be applied 15–20 days after germination after weeding and thinning, which coincides with the beginning of tillering.

Medium-duration rice, direct-seeded on puddle :

While an application of 100 kg of nitrogen per ha at seeding gave a yield of 3867 kg the crop gave 2978 kg under unmanured conditions.

An application of 25 kg of nitrogen per ha at seeding, 50 kg at tillering and 25 kg at panicle initiation, or applying 75 kg at tillering and 25 kg at panicle initiation, boosted the yield to 4460 kg/ha. This amounts to an extra yield of 6 qtl through split application.

Early and medium varieties transplanted :

In trials, increased yields from split application of nitrogen were as spectacular as in direct-seeded rice.

While an application of 100 kg of nitrogen per hectare at transplantation produced a yield of 4667 kg compared with 3407 kg under unmanured conditions, application of 75 kg nitrogen at transplantation and 25 kg at panicle initiation or at booting gave a yield of 4769 kg/ha. This meant an increase of one quintal.

Applying in three splits–50 percent at transplanting, 25 percent at tillering stage and 25 percent at panicle initiation stage or booting increased the yield further to 4889 kg. This meant an increase of 2.2 qtl over a single application.

This only indicates that there is scope for increased yields through split applications with the same amount of nitrogen at a small extra cost per application.

Phosphorus is continuously absorbed by the rice plant from planting to the flowering stage. It should generally be applied at sowing/transplanting. Superphosphate should be generally applied to neutral soils and rock phosphate to acid soils.

If rock phosphate is applied at least a month before transplanting and properly incorporated in the soil with the first showers, the availability of phosphorus both from native and fertiliser sources increases.

The rock phosphate used should be at least of 100 mesh and should be uniformly broadcast rather than placed in furrows as in the case of water-soluble phosphate fertilisers.

Correcting acid soils with rock phosphates :

About 30% of soils growing rice in northeastern India are acidic, and it would be worthwhile covering large tracts of this area with rock phosphate.

High yielding varieties of rice generally respond well to potassium compared with locally improved varieties. The response is seen in acid sandy soils subject to high rainfall, particularly in kharif.

Split application of potassium should be done in very light, sandy soils subject to leaching of plant nutrients.

A study to identify areas which respond to micro-nutrients has shown that 25 to 60% of those studied in Punjab, Haryana, Rajastan, the eastern and Tarai regions of UP, and Andhra Pradesh and Tamil Nadu are deficient in zinc.

Unless this is corrected even adequate applications of NPK will not bring out the full potential of the crop. The area which will respond to zinc application is roughly about 10 million ha.

Field trials have shown that an application of 25-50 kg of zinc sulphate per ha will result in an increase of 3-10 qtl of grain per ha in zinc deficient areas. The cost of application will come to between Rs. 125 and Rs. 250.

The fact that varieties like Jagannath, Vijaya, Pankaj and RP–5–13 (Sona) are reported to be not faring well may partially be due to zinc deficiency, to which these varieties are sensitive.

Water Management for direct-seeded crop :

With a limited water supply extra care should go into constructing and maintaining levies. Water distribution must be so managed that the excess is prevented from flowing away from the field.

For efficient water use recapture the flow from the field for use on lower fields in the immediate area or downstream.

In fields where the soil has not been puddled and is managed in upland conditions it is advantageous to construct weirs at several places in the drainage ditch and raise the water table to the field as well as the surrounding areas by adjusting the level in the ditch.

Transplanted rice :

Level the field perfectly before transplanting as this will help efficient water control and use.

Starting with a thin film at transplanting, irrigate once a week up to 5 cm depth during crop growth. Maintain the water level at 5 cm from panicle initiation till grain filling.

This system of water management may give rise to some weed infestation. Therefore keep the field weed-free.

Continuous flooding of rice in kharif is popular among farmers. The combined factors of waterlogging and residues of the previous crop in the soil after transplanting, aggravate soil reduction and result in the formation of toxic substances. The most suitable water management is intermittent irrigation.

Temporary drainage is not recommended in areas where water needed for reflooding is not assured.

Very large areas of low-lying lands, something like 6 mn ha, are becoming less productive because of waterlogging.

In addition to this there is the drainage problem in many localised areas along the coast because of periodic increase of seawater at high tide, thus making the affected areas saline. Such areas are estimated to be about 6 mn ha.

For any programme of drainage in these areas the source of waterlogging and extent of drainage required should be identified. A drainage system provide the plants with an environment which will help plant growth best on a permanent basis should then be planned.

This would need co – operative efforts on the part of the village community and the watershed community.

Recycling water and nutrients :

Higher yields can be obtained by using drainage water. It has been found that such water contains 3–5 ppm of nitrogen.

Collect seepage and drainage water in the drainage channels and pump it back to the higher elevations by using a low lift handpump.

Water control structures :

There are several devices and methods which reduce water and save labour and energy.

Important among these are prefabricated channel sections, hume pipes, gates, drop pits, diversion structures, canvas and metal dams, siphon tubes and spiles.

In recent years, studies have indicated that low-cost materials and techniques for the construction of an efficient water distribution system are successful on small holdings.

All these structures can cast on the the farm by semi-skilled technicians or by the farmer himself with a little practice.

Source : Farmfare, March 1974

Grain response to 1 kg. of nitrogen

All India co-ordinated trials have shown the level of nitrogen for high yielding varieties of rice. The grain response per kg of nitrogen was :

Variety	50–00	100–50	150–100	200–150
Early	14.3	8.8	5.6	1.7
Medium	18.7	14.2	5.0	1.4
Late	9.8	5.5	0.2	0.1

Benefit-cost ratio

Taking the cost of rice as 70 paise per kg and the cost of 1 kg of nitrogen af Rs. 2.30, the following are the benefit-cost ratio :

Variety	50–00	100–50	150–100	200–150
Early	3.6	2.2	1.4	0.5
Medium	4.7	3.5	1.2	0.3
Late	2.4	1.4	0.05	0.02

Response to N in NE India, Punjab & Haryana

On the basis of studies conducted on the grain responses of early, medium and late varieties in the northeastern region, the following are considered the economic optimum doses of nitrogen for high-yielding varieties in different States.

	Early kg/ha	Medium kg/ha	Late kg/ha
Assam	50	30	25
Bihar	80	100	30
West Bengal	30	50	80
Orissa	60	80	60
Madhya Pradesh	80	80	100
Utter Pradesh	100	100	–
Punjab, Haryana	80	120	–

3) Iron and soil

Iron and soil :

Since 4.2% of the earth's crust is iron making it the fourth most abundant element preceded only by oxygen, silicon, aluminium, it is difficult to anticipate iron deficiency occuring in plants. Some highly calcareous or carbonaceous soils do represent problems of iron deficiency which are naturally occuring. It is not the level of iron in the soil which is the controlling factor but rather the availability of this element to plants for its proper nutrition.

The most wide spread, perhaps the universal symptom of iron deficiency in green plant is reduced concentration of chlorophyll, a condition commonly knows as 'chlorosis'.

Functions of iron in plant nutrition :

Various workers have placed iron, which occuring as a metallo-organic complexes acting as an oxygen carrier, oxidising catalyst or enzyme. Iron plays an important role in the whole series of respiratory enzymes. As a constituent cytochrome it not only functions in respiratory enzymes but also probably is involved in photo-synthesis since it is essential for completion of photosynthetic reactions.

Factors affecting Iron chlorosis :

The amount of iron proportional to the chlorophyll content of a plant is termed as active iron. Thus factors that limit the supply of so called active iron in plant limit its life.

The soil iron available to plants is altered markedly by its environment. The carbonates and bicarbonates formed from decomposing organic material in an acid soil aim the reduction and solubility of iron. The reverse is true in a calcareous or alkaline soil.

The relative amounts and ratios of calcium, potassium, phosphorus and nitrogen in plant are altered with the development of chlorosis. The chlorotic leaves have a higher ratio of potassium to calcium or phosphorus to iron and contain more nitrogen than green leaves. These conditions may be a result of chlorosis rather can a cause.

The concentration of certain heavy metals–copper, zinc, cobalt, manganese have a direct bearing on chlorosis. No general statement can be made about the harmful concentration of these. One plant species may tolerate more of a certain minor element than another.

The other most common conditions associated with iron chlorosis in plants are presence of low and high temperatures, synthetic chelating agents, presence of certain micro-organisms, certain root stock combinations, potassium deficiency, high light intensities, root damage by nematodes, virusus and high level of nitrate nitrogen.

Symptoms of iron chlorosis in plants :

The most common visual symptoms of iron deficiency (chlorosis) in plants are, the pale yellowish

colour foliage in the presence of nitrogen and on soils that are high in lime or manganese, light band along margin of leaves and short and much branched roots.

In cereals occurence of iron chlorosis has been reported in sorghum, rice, oats, corn and wheat. Iron chlorosis in cereals is diagnosed with appearance of intervienal chlorosis or stipping which extends the full length of the leaves. It is more severe on upper young leaves. In case of prolonged and acute iron chlorosis plants become almost white and die prematurely. In corn and sorghum the symptoms are almost alike except the degree of succeptibility.

Beans, peas, groundnuts, soyabeans and red clover have been reported to suffer from iron chlorosis especially when their cultivation is undertaken on the high lime calcareous soils. Mostly in all these legumes, in the initial stages the area between leaf veins turn yellow just as with manganese deficiency and as the deficiency advances the whole leaf becomes yellow to white in colour. In several chlorotic leaves nectrotic spots may be observed. Plants exhibiting iron chlorosis remain dwarf and poorly developed.

In various fruit trees iron chlorosis occurs on soil with high pH about 7.8 and a high lime and low organic matter. It has been reported in apple, avocado, apricot, cocoa, peach, pear, pineapple, plum, blueberry, raspberry, grapes, gooseberry and grewia asiatica. The area between the veins turns pale green to yellow in striking contrasts to the veins that remain green. In severe cases the new leaf may unfold completely devoid of green colour but veins usually turn green later on. Older leaves always appear normal possessing green colour.

Control of chlorosis :

Addition of iron salts to the soil where its pH is high, are not very successful due to reversion of the iron to an unavailable form, soil acidifying materials mainly elemental sulphur powder and sulphuric acid give some relief on such soils. Foliar application of iron salts is sometimes effective but often results in spotty effects and must be repeated in order to cover any new growth.

Development of the chelating agents for plant nutrition have proved the most successful means of combating iron deficiency. Unfortunately these chemicals are not manufactured in our country and their import on commercial scale does not seem to be a possibility at least in near future.

Source: Farmer and Parliament, November, 1973

1. Brown rice recovery in respect of some released varieties and varieties under trial in Karnataka State :

Forty varieties were studied for their brown rice recovery by using the laboratory huller, used at Central Food Technological Research Institute, Mysore. Representative samples were drawn from the experimental produce of different varieties after bulking all the replication yields in 1972 kharif. It was observed from the table that the minimum hulling recovery was 74.8 per cent in case of MR-262 and the maximum was in respect of Jaya, being 80.04 per cent. The other cultures which showed high brown rice recovery were MR-114, MR-135, MR-250 and IET-1410. The cultures which were poor in the proportion of brown rice to rough rice were IET-724, MR-13, MR-134, MR-251, IET-1996 and Ratna. The brown rice recovery of promising cultures like MR-118, Sona, Madhu and Jagannath are above the average.

This kind of information in respect of the newly developed rice varieties is of practical importance to Breeders, Agronomists and Economist as it will influence the market rate considerably since the recovery of head rice which is the ultimate product for consumption depends on the brown rice content in paddy. It may be pertinent to mention here that the brown rice proportion is one of the important factors beside the cautious handling at the stage of harvesting. drying and storage, in pushing maximum head rice recovery from the rough rice. The efficiency of mill is, of course, also a contributing factor.

2. S-141-A new promising safflower variety for scanty rainfall areas :

Safflower extensively grown as a rainfed crop and for the lost two or three years the crop is being grown under irrigated conditions in the T. B. P. areas. The safflower is also grown as mixed crop with bengal gram, wheat and rabi jowar. Since the crop is drought resistant, it could be successfully grown even in scanty rainfall areas like Bellary, Belgaum and Bijapur districts. The yield per acre from the existing varieties like A-300 and 7-13-3 range from 1.5 to 2.5 quintals under dryland agriculture. In order to study the potentiality of some of the newly develped safflower varieties, a study was made at Agriculture Research Station, Hagari on black soils from 1970-71 to 1972-73. The results obtained from the three years are summarised below.

Out of the six varieties tried, S–141 has consistently given the highest yield followed by S–129–3 and S–144. The yield differences for the later two varieties appeared negligible. An increase of nearly 12% more yield was obtained from S–141 variety compared to the existing variety 7–13–3. S–129–3 and S–144 have also registered 7 and 6% more yield over 7–13–3. Lowest yield was obtained from S–2, though the variety had more number of capsules but the seed per capsule were far less from any of the varieties. The number of flowers per plant and seeds per capsule were also recorded and was noticed that number of capsules per plant as well as number of seeds per capsule were more with S–141. As regards the maturity period, it was observed that there was no difference. All the varieties took about 117 to 118 days for maturity. The economic analysis of the varieties revealed that S–141 fetches a total income of Rs. 1,260, i.e., about Rs. 130 more than 7–13–3 followed by S–129–3 (Rs. 1,211) and S–144 (Rs. 1,206). Taking into consideration the rainfall for the above periods it could be inferred that even in years of drought the variety S–141 has recorded more yield and in normal years the yield per hectare is in the range of 8.5 to 9.5 quintals.

Performance of safflower varieties at A.R.S. Hagari

Sl. No.	Varieties	Yield in kg/ha 1970-71	1971-72	1972-73	No. of capsules per plant	No. of seeds per plant	Total returns per ha in Rs.
1.	S-2	731	797	298	25.8	12.9	1096.00
2.	S-141	931	849	321	23.7	16.3	1260.00
3.	S-142	810	810	239	23.1	15.6	1109.00
4.	S-144	842	847	320	23.7	15.1	1206.00
5.	S-129-3	921	778	319	22.6	16.0	1211.00
6.	7-13-3	787	783	313	22.0	15.7	1130.00

3. Incidence of shootfly (Atherigona Varia Soccata Rondani) and its effect on yield of Rabi Sorghums ;

One of the methods of combating insect pests is to adjust the sowing date, so that the crop escapes their attack. This is true in the case of the sorghum shootfly (Narayan and Narayan, 1967; Usman, 1968; Jotwani et al., 1970). An experiment was conducted at the Agricultural Research Station, Bijapur, to examine the incidence of the shootfly by advancing the planting date to September instead of normal sowings done in October during rabi season and to study the relative performance of some promising new rabi strains in comparison with the well established entry, M 35-1.

The experiment comprised 12 treatments. Six entries, viz., CSH-1, R-16, R-24, R-30 and R-147 were sown on two different dates, 17th September, 1971, (advanced sowing) and 6th October, 1971, (normal sowing) in a randomised block design with 4 replica-

tions. The net plot size was 6.0x1.8m. Fertilisers were applied at the time of sowing at the rate of 60 kg N, 30 kg P_2O_5 and 20 kg K_2O/ha. The crop was sprayed with Endrin 20 EC at 2.8 lit/ha 25 days and 45 days after germination for stem borer control. There was no incidence of defoliators and earhead pests. The incidence of shootfly was recorded four weeks after germination, based on the number of plants showing deadhearts and the total number of plants per plot. The grain yield was noted. The data are presented in the Table.

The results indicated that the percentage of deadhearts due to shootfly in advanced sowing was low as compared to the normal sowing in all the entries (Table I). CHS–I showed highest percentage of incidence both in advanced and normal sowing as it recorded 40.5 and 42.8 per cent deadhearts respectively; however, the difference in the two sowings was negligible. M 35–1 showed lowest percentage of deadhearts in both the sowing dates as compared to other strains. It showed higher infestation (19.2 per cent) in normal sowing date as compared to that in advanced sowing (3.0%). The strain R-147 also showed low percentage of deadhearts (5.0 percent), in advanced sowing and high (27.0%) in normal sowing. The incidence of shootfly in R-24, R-30 and R-16 ranged from 14 to 15% in advanced sowing and 30 to 34% in normal sowing.

TABLE-I

Incidence of the shootfly and yield in rabi Sorghums

Sl. No.	Treatments	Average percentage of dead hearts due to shootfly		Average grain yield kg/ha	
		Advanced sowing (17-9-71)	Normal sowing (6-10-71)	Advanced sowing (17-9-71)	Normal sowing (6-10-71)
1	CSH–1	40.5 (39.47)	42.8 (40.74)	16.5	18.50
2	R–16	15.2 (22.88)	34.3 (35.74)	15.72	7.40
3	R–30	15.1 (22.85)	30.6 (33.32)	18.50	21.27
4	R–24	14.1 (22.33)	30.3 (33.12)	26.82	6.40
5		5.0 (12.35)	27.2 (30.37)	22.20	5.50
6	M 35–1	3.0 (9.94)	19.2 (26,66)	22.20	12.20
	C.D. at 5%	(1.0)		15.5	

Note: Figures in parentheses indicate transformed values (Angular transformed).

Grain yield (q/ha) was more in advanced sowing except in CSH-1 which yielded more in normal sowing season. However the difference was not significant. R-24 a rabi strain gave maximum yield in both the sowings; highest yields being 26.82 q/ha in the advanced sowing. There is no significant difference in yield between entries sown in advanced sowing. There is no significant difference in yield between entries sown in advanced sowing. In a few entries there is significant difference between the two sowings, viz., R-24 in advanced sowing differed significantly from R-30, R-16 and R–147 in normal sowing and R-147 and M 35-1 in an advanced sowing also differed from R-16 and R-147 in normal sowing.

Source : Current Research, Vol. III, No. 3, March 74, U.A.S. Bangalore

VII News in brief :

1. Sixty thousand tonnes of plant nutrients costing Rs. 12 crores can be saved by controlling weeds in 1974-75:

The Ministry of Agriculture, Government of India is organising a massive campaign for the control of weeds in order to save fertilizers. It is proposed to cover about 2 million hectares of high yielding varieties under this programme, so that fertilisers can be saved in 1974–75. About 2,500 tonnes of weedicides (technical grade) would be required for 1974-75 which will cost about Rs. 7 crores. By using weedicides on an extensive scale, it is estimated that 60,000 tonnes of nutrients costing Rs. 12 crores in foreign exchange could be saved. The weedicides industry has promised to mobilise their resources to produce weedicides to meet this great challenge posed by the shortage of chemical fertilisers in the country.

2. Forty five Mechanical Compost plants to be installed during the Fifth Plan period :

The Union Ministry of Agriculture has prepared a very comprehensive programme to exploit the local manurial resources for production of organic manures like urban compost and rural compost during the Fifth Five Year Plan to meet the shortfall of chemical fertilisers. This will be taken up as a Centrally Sponsored Scheme. The outlay proposed for this programme is Rs. 9 crores during the plan period. An equal amount will have to be provided by the States for this programme. The Ministry of Works and Housing has also provided Rs. 10 crores for production of urban compost. It is proposed to prepare 7.5 million tonnes of a compost a year by end of the Fifth Plan period which is estimated to yield 0.112 million tonnes of nitrogen, 0.075 million tonnes of Phosphorus and 0.112 million tonnes of Potash. It is proposed to install 45 mechanical Compost plants during the Fifth Plan Period in cities having a population of more than 3 lakhs.

Plants in Karnataka :

Karnataka State has also a proposal to set up mechanical compost plants in Bangalore, Mysore, Dharwar, Davangere and Mangalore in the Fifth Plan. Each plant is estimated to cost over Rs. 60 lakhs.

First Mechanical compost plant in Gujarat :

Gujarat State has a feather in its cap by setting up the first Mechanical Compost Plant in the country in Ahmedabad through the Agro-Industries Corporation. The plant

with a capacity to produce 120 tonnes per day is expected to be commissioned shortly.

Rural compost:

The production of rural compost is proposed to be raised to 350 million tonnes a year by organising massive campaign and mobilising all the resources.

It is estimated that 15 million tonnes of urban compost of good quality containing about 1.5% nitrogen, 1% phosphoric acid and 1.5% potash superior to ordinary manure could be prepared every year from the urban waste available in the country. At present urban compost production is under progress in 3,200 urban centres producing about 4.5 million tonnes. There is therefore great scope for increasing the compost in the country.

3. 50,000 Gobar gas plants to be installed during the Fifth Plan period :

The Khadi and Village Industries Commission has a proposal to install 50,000 gobar gas plants during the Fifth Plan period. About 7,000 gobar gas plants have been installed in the country so far. Gujarat State is leading the other States. and it has installed the maximum no. of gas plants in the country. Syndicate Bank, Canara Bank and other nationalised Banks have come forward to extend loan facilities for installation of gobar gas plants.

Fertiliser quality control laboratories:

The Union Ministry of Agriculture have agreed to sanction 2 Fertiliser Quality Control Laboratories in the Fifth Five year plan ; one at Bangalore and the other at Dharwar at a cost of Rs. 12 lakhs.

VIII DEPARTMENTAL NEWS :

a) Director's Tour

The Director of Agriculture accompanied the Hon'ble Minister of Agriculture to Mandya on 8-3-74 and attended the programme of presentation of Japanese Vehicles by the Japanese Government for the use of Indo-Japanese Agricultural Extension Training Centre, Mandya. He went to Dharwar on 29-3-74 to review the annual plan for 1974-75 in respect of Dharwar Division where in he also inspected the Agricultural School at Devihosur. He again accompanied the Hon'ble Minister of Agriculture to Haveri on 31-3-74 and participated in the Farmers Conference.

b) Promotions & Transfers: *Nil*

c) Schemes : *Nil*

d) Publications, Extension Materials and Radio Talks:

Pamphlets on control of gallmidge on paddy and package of practices of castor were printed in the departmental press and the same were being distributed to the technical personnel of the department.

Fortnightly seasonal tips for the benefit of the farmers in the State for the month of March, '74 were prepared in consultation with the Specialists of the Directorate and sent to the Dept. of Information and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this, News of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme "Krishi Ranga".

Compiled by :

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On the farm front

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FARM ADVISORY AND EXTENSION SERVICES

DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

The season this year has started with a promising note with the receipt of timely and favourable showers all over the State. While these rains are most welcome every where, this is particularly so in areas where early kharif sowings are taken up.

Hybrid Jowar:

Kharif jowar forms the chief grain crop taken up during the season. The department has taken up a very realistic programme under Hybrid Jowar to cover 4 lakh hects. Dharwar, Chitradurga, Mysore, Bellary, and Shimoga are the districts where large areas are expected to be covered under this variety. Although initially there were some difficulties to meet the the demands of seeds, the problem has greatly eased with the seeds of summer seed production plots becoming available as a result of hectic efforts made in this direction. Already nearly 4000 qtls. of seeds have been rushed based on the needs of different areas and it is hoped that by the time sowings start in late kharif areas, the needed seeds will be already in the hands of the farmers. The extension staff should do well to advice the farmers to dry the seeds properly before using them for sowing as these seeds were processed only a few days back.

Hybrid Maize:

The rains, in a similar way, are very helpful, for taking up sowings of Hybrid Maize under rainfed conditions. The department has a programme to cover 1,00,000 hects. under this crop during the kharif season. Now that timely showers have been received, it should be possible to achieve the target fully.

Sunflower:

Another major programme of the department designed to boost oilseed production is the expansion of area under Sunflower cultivation. The coverage of 35,000 hects. during last year was quite encouraging and this has given a fillip to plan for a higher coverage during 74–75. During the current kharif season, it is proposed to cover an area of nearly 45,000 hectares under this crop. The opportunity provided by the timely rains should be made best use of by the extension staff towards reaching the goal.

Pulses:

The State, as all of us are aware, is deficit in Pulses to the extent of 4.5 lakh tonnes annualy. Government are therefore very keen to step up production of pulses for which excellent opportunities are available in the State. The major pulse crops grown in the State are Redgram, Bengalgram, Cowpea, Blackgram and Greengram. The reason for the poor performance under Pulses may be due to lack of adequate attention towards development of these crops as most of the attention hitherto was concentrated towards development of cereals and commercial crops. There is much scope for development of Pulses in the State and therefore the department has drawn up a big programme to concentrate on its production in an area of 10,00,000 hectares. Targets have already been communicated. Farmers have to be educated with regard to the correct cultivation practices as also the use of bacterial inoculations.

Soyabean:

A token programme under Soyabean has been included this year. This should be given a fair trial and farmers encouraged to use the produce in their daily diet as it is most nutritious.

Special attention:

Attention during the year has to be concentrated on production and use of natural manures, use of bacterial cultures, weed control, etc. Farmers should be especially encouraged to go in for cow dung gas plants. The idea has to be canvassed by all the Extension Staff.

Card system for fertilisers:

The card system for the issue of fertilizers to farmers is set to start on 15-6-1974. Guidelines have already been issued in this behalf. The district staff are specially requested to spare no efforts to see that scheme meets with the approval of the farmers. There are bound to be some initial organisational difficulties. We should be able to solve them by applying ourselves seriously on this task.

Dr. H. L. Kulkarny
Director of Agriculture

II How the previous month was

(Seasonal and crop conditions during April 1974)

Fairly good showers were received in the northern districts of the State, whereas scattered rainfall was received in some of the southern districts which was of immense help to summer crops. Preparatory cultivation for sowing of early kharif crops was going on briskly in most of the districts. The weather was mainly dry and hot. The agricultural situation in brief for each division is given below:

Bangalore division :

Dry and hot weather prevailed in Bangalore district whereas fairly good showers were received in Chitradurga, Kolar, Shimoga and Tumkur districts. Important agricultural operations carried out were sowing of hybrid maize, top dressing of paddy, hybrid maize and ragi, harvesting of groundnut, potato, ragi, intercultivation, weeding, top dressing and earthing up of sugar cane and preparatory cultivation for sowing of kharif crops. Blast and stem borer on paddy and ragi, aphids and earhead pests on hybrid jowar, leaf miner on groundnut, stemborer on hybrid maize were noticed, against which necessary plant protection measures were taken up.

Mysore division:

Widespread rains were received in Mysore, Hassan, Chickmagalur and Coorg districts. Dry and hot weather prevailed in Mandya and South Kanara districts. Sowing of hybrid jowar, sunflower, sea island and My-14 cotton, harvesting of hybrid maize, sugarcane, hybrid jowar, top dressing of paddy and ragi and preparatory cultivation operations were some of the important agricultural operations carried out. Blast, stemborer, caseworm, leaf rollers on paddy, and blast and stemborer on ragi were noticed. Necessary control measures were taken up to check the further spread of pest and disease attack.

Belgaum division :

Scattered showers were received in Belgaum and Bijapur districts. Fairly good rainfall was received in Dharwar and North Kanara districts. These early monsoon rains have brought relief to the cultivators. Harvesting of summer crops, carting of farm yard manure, weeding and interculturing of summer groundnut, hybrid jowar, hybrid bajra and sugarcane, sowing of drill paddy, and harvesting of groundnut were some of the major agricultural operations carried out. Excepting slight incidence of stemborer on sugarcane, there were no reports of incidence of major pests and diseases.

Gulbarga division:

Sporadic rainfall was received in Bellary and Raichur districts. Passing showers were received in Gulbarga and Bidar districts. Weather was mainly dry and hot. Sowing of hybrid jowar, harvesting of groundnut and hybrid jowar, top dressing and earthing up of sugarcane and land development works in the Tungabhadra command area were some of the important agricultural operations carried out. There were no reports of incidence of major pests and diseases.

INPUTS FOR FARMERS:

Distribution of fertilisers on Card System:

The Card System which will come into force from 15-6-74 being new to the State, there is bound to be certain amount of confusion and complication in the implementation of the system in the initial stages. These teething troubles are however inevitable in any distribution arrangement involving thousands of farmers as well as distribution points scattered all over the state. Writing up of cards, arranging supplies aud watching progress of distribution etc., are a stupendous job calling for disciplined and co-ordinated efforts and hard work on the part of all concerned. The extension machinery at various levels should be fully geared to tackle new responsibilities and tasks. There is need for constant consultations with the deputy Commisioner, Deputy Registrar of Co-op. Societies, and other agencies connected with the fertilizer distribution programme and tackling of local problems with their assistance. It is hoped that all the extension workers will rise to the occasion and successfully face the challenge posed in the introduction of the new system.

In addition to the supplementary instrutions which were issued earlier, the following points are to be noted:

a) A card should be tagged to 3 dealers which include co-operative Societies. Fertillisers can be drawn from any of the 3 dealers.

b) The Deputy Director of Agriculture, Assistant Directors of Agriculture and other concerned will sit together, assess the probable receipts at each of the selling points based on past records and arrange tagging on of cards on the basis of probable availability. The tagging on cards to dealers is an intelligent task which calls for proper advance planning and efficient execution so that there is no avoidable pressure on any of the dealers.

c) The dealers should be informed in advance of the serial numbers of the cards and the names of the farmers tagged on to them.

d) A dealer should declare the stocks immediately on receipt.

e) Dealers should maintain a register indicating the names of farmers attached to him, the quantity of fertilisers eligible and the actual supplies made.

f) A dealer should send a monthly report to the Block Development Officer and Assistant Director of Agriculture, indicating the actual supplies made to card holder during the month. This report should reach before 5th of the succeeding month.

g) Not more than 1/6 of the requirement of the season should be supplied to the card holder every month. No advance supplies or pre-ponement of next months quota are permitted.

h) If the monthly quota is not lifted by any farmer during the month, the quota will lapse. However, the quota will not lapse if the supplies are not made due to non availability of fertiliser during a particular month. In such cases an endorsement should be made by the dealer on the card.

i) Particulars of quota which lapse, due to non lifting should be furnished to the Taluk Fertiliser Committee.

ii) Quantity of fertiliser issued to farmers should be entered in the card by the dealers both in words & figures in terms of N.P.K.

Inspection and Supervision :

a) It is the responsibility of the Deputy Directors of Agriculture and the Asst. Directors of Agriculture, to ensure steady supply so that card holders can get their quota without difficulties.

b) If for any reasons, the dealers do not get their quota from the manufacturers, during any period, the Deputy Directors of Agriculture, will arrange to pump in fertilisers from 'pool' sources.

c) There is need for vigilance and constant watch to prevent misuse of cards and eliminate bogus cards. The Deputy Directors of Agriculture, Asst. Directors of Agriculture, Agricultural Officer, (Manure) and others concerned with fertilisers distribution work will visit as many sale points as possible and ensure that the fertilisers are properly issued to the card holders.

d) There is also need to check and scrutinise the cards held by the farmers. The following targets are fixed:

1	JDA	200 cards/month
2	DDA	500 ,,
3	ADA	500 ,,
4	AO (Manure)	1500 ,,

As already stated, the issue of fertilisers against cards is a new system introduced in the State and hence will be under trial. The instructions now issued may not cover all aspects of the problems that may arise in future. Nor it is possible to visualise the difficulties and problems that may crop up in the implementation of the new system. The difficulties and problems will have to be tackled at the local level as and when they arise or brought to the notice of the Directorate in appropriate cases for issuing guidelines. The working of the system will be reviewed after the kharif season and necessary changes made if necessary in the light of experience gained.

IV ARTICLES CONTRIBUTED BY THE DEPARTMENTAL OFFICERS

I) Insecticidal trial to judge the efficacy of different insecticides in controlling pests on paddy

S. S. Katagihallimath, D.D.A. (Entomology), Bangalore and
N. Baburayanayak, Technical Assistant to the DDA (Entomology), Bangalore

Four field trials were laid out during kharif season of 1973 in the following 4 places :

1. Alkere (Mandya district).
2. Kalavara (S.Kanara district).
3. Nanjangud (Mysore district).
4. Holangadde (North Kanara district).

The 4 treatments and a control in each of the 4 field plots have been designated as follows:

T1. Chlorofeminphos 24% Ec (Birlane) +Hinosan.
T2. Leptophos 34%Ec (Phosvel) +Hinosan.
T3. Fenthion 1000 (Lebaycid) +Hinosan
T4. Parathion 50%Ec +Hinosan.
T5. Control-untreated Check plot.

The area of each treatment in each trial was 20 cents. The quantities of insecticides used were (1) 194ml chlorofeminphos 24% Ec + 54 ml Hinosan (2)80 ml Leptophos+54 ml Hinosan, (3) 54 ml Fenthion+54 ml Hinosan (4) 54 ml. Parathion+54 ml Hinosan in 54 litres of water for each application.

In all 4 applications were given in the transplanted paddy fields at an interval of 25 days starting from 25 days after transplanting. Observations were taken on the incidence of pests and diseases in each treatment in an area of 4 sq.metre at random both before and after each application.

Average incidence of pests and diseases was worked out and the same is given in tables I to IV along with yield data.

Conclusion :

It can be made out from the tables that all the treatments are superior to control and in yield. Out of the 4 trials Fenthion ranks first in the yield as well as in the control of pests. In 3 trials, the next bests are chlorofeminphos and Leptophos.

Acknowledgement :

The Deputy Directors of Agriculture South Kanara, Mysore, Mandya and North Kanara Districts and particularly their plant protection staff are to be thanked for helping in conducting these trials. Thanks are also due to Dr.H.L.Kulkarny, Director of Agriculture in Karnataka, Bangalore and Sri B. P. Venkataramaiah, Joint Director of Agriculture (ICP and DEVT) for their encouragement.

TABLE–I

Place : Alkere, Mandya Distric

Average pre and post treatment incidence of paddy pests and diseases in the several treatments

Sl. No.	Name of insect/ disease	Treatment No. I		Treatment No. II		Treatment No. III		Treatment No. IV		Control	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Thrips	—	—	—	—	—	—	—	—	—	—
2	Stemborer	0.90	0.72	0.85	0.80	0.90	0.45	0.80	1.12	3.50	3.65
3	Leaf roller	1.07	0.55	0.85	0.52	1.40	0.42	0.80	0.52	3.97	3.30
4	Gallfly	0.12	0.20	—	—	—	—	—	—	—	—
5	Mealy bug	—	—	—	—	—	—	—	—	—	—
6	Jassids	—	—	—	—	—	—	—	—	—	—
7	Grass hopper	—	—	—	—	—	—	—	—	—	—
8	Army worm	—	—	—	—	—	—	—	—	—	—
9	Helminthosporium	2.00	1.72	1.72	1.50	2.05	1.67	1.95	2.00	3.40	2.92
10	Udabatta	0.70	—	0.07	—	—	0.05	0.10	—	0.10	0.07
11	Grain yield	27 qtls./acre		28 qtls/acre		29 qtls/acre		28 qtls/acre		24 qtls/acre	
12	Straw yield	61 ,,		59 ,,		55 ,,		57 ,,		52 ,,	
	Ranking	3		2		1		2		4	

TABLE–II

Place : Kalavara, S. Kanara Dist.

Average pre and post treatment incidence of paddy pests and diseases in the several treatments

Sl. No.	Name of insect/ disease	Treatment No. I		Treatment No. II		Treatment No. III		Treatment No. IV		Control	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Thrips	2.70	1.78	3.22	2.11	3.30	1.55	3.55	1.89	4.55	4.33
2	Stem borer	3.77	3.00	3.70	2.33	3.00	1.70	3.44	1.99	6.33	6.11
3	Leaf roller	3.30	2.22	3.77	1.89	3.66	1.33	3.22	1.55	5.00	4.88
4	Gallfly	8.70	7.00	9.20	6.00	8.30	4.44	8.00	6.55	12.00	11.33
5	Mealy bug	....	....	....	....	....	....	....	....	....	....
6	Jassids	3.88	1.7	3.10	1.89	3.55	1.44	2.55	1.33	3.22	2.55
7	Grass hopper	3.70	1.0	3.10	1.33	2.30	1.55	2.22	1.22	2.88	2.55
8	Army worm	....	....	....	....	....	....	....	....	....	....
9	Ear head bug	....	....	....	....	....	....	....	....	1.00	0.70
10	Grain yield (per acre)	28.60 qtls		26.20 qtls		29.80 qtls		28.20 qtls		23.40 qtls	
11	Straw yield (per acre)	49.50		50.60		50.80		52.20		43.64	
	Ranking	2		4		1		3		5	

TABLE–III

Place : Nanjangud, Mysore District

Average pre and post treatment incidence of paddy pests and diseases in the several treatments

Sl. No.	Name of insect/ disease	Treatment No. I		Treatment No. II		Treatment No. III		Treatment No. IV		Control	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Thrips	14.4	12.75	7.10	6.50	7.75	3.75	11.00	8.00	17.50	9.75
2	Stemborer	—	—	6.11	5.12	—	—	2.12	1.75	13.62	45.62
3	Leaf roller	10.4	7.8	1.00	2.50	3.00	2.62	9.80	10.00	13.90	11.90
4	Gallfly	—	—	—	—	—	—	—	—	—	—
5	Mealy bug	—	—	—	—	—	10.00	—	—	—	—
6	Jassids	11.5	2.0	9.00	9.75	7.00	4.50	4.70	3.10	16.50	14.90
7	Grass hopper	—	—	—	—	0.88	—	—	—	2.31	2.50
8	Army worm	—	—	—	—	—	—	—	—	—	—
9	Leaf spot	8.4	9.75	10.10	13.62	15.62	11.40	7.81	5.50	11.40	6.90
10	Blast	—	—	3.00	1.25	—	—	—	0.50	—	—
11	B–Blight	—	—	—	—	1.90	1.50	1.90	1.40	—	—
11	Grain yield (per acre)	37.00 qtls.		36.00 qtls		41.35 qtls		31.85 qtls		28.40 qtls	
	Ranking	3		2		1		4		5	

TABLE–IV

Place : Holangadde, S. Kanara Dist.

Average pre and post treatment incidence of paddy pests and diseases in the several treatments

Sl. No.	Name of insect/ disease	Treatment No. I		Treatment No. II		Treatment No. III		Treatment No. IV		Control	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Thrips	....	....	....	....	....	....	....	....	....	....
2	Stem borer	....	....	....	....	....	....	....	....	....	....
3	Leaf roller	Trace	....	0.33	....	1.00	....	0.70	....	2.00	3.00
4	Gallfly	0.70	0.33	0.70	0.33	0.33	0.33	1.33	1.7	2.00	2.67
5	Mealy bug	....	....	....	....	....	....	....	....	....	....
6	Jassids	....	....	....	....	....	....	....	....	....	....
7	Grass hopper	....	....	....	....	....	....	....	....	....	....
8	Case worm	0.33	....	0.70	....	0.70	....	0.70	....	1.00	1.33
9	Ear head bug	....	....	....	....	....	....	....	....	....	....
10	Grain yield (per acre)	34.80 qtls		36.80 qtls		36.00 qtls		34.00 qtls		30.40 qtls	
	Ranking	2		1		3		4		5	

2) Control of shootfly (Atherigona Indica) in hybrid jowar in Bijapur district

B. H. Sindgi, DDA, Bijapur & S. P. Managoli, A.D.A., Sindgi.

Bijapur District is having an area of 16,97,314 acres under jowar and stands second in the State, so far as area is concerned. Out of this area, 2,56,707 acres are grown under kharif and 14,40,607 acres under rabi season. The common and popular variety grown in the district is Maldandi 35-1. This strain is supposed to be drought resistant. The average per acre yield of jowar is 134 kgs/acre. With the launching of high yielding varieties programme in the district during 1966-67, the area under hybrid jowar has increased considerably, though the increase is erratic as seen from the following figures :

Year	Average
1966-67	1922
1967-68	1449
1968-69	1834
1969-70	7787
1970-71	9547
1971-72	13337
1972-73	7020

In the case of Mexican wheat, hybrid bajra and hybrid maize, on the other hand, the increase has been constant. This is because of limitations in the cultivation of jowar. Amongst them, the incidence of major pests like 'shootfly' (Atherigona indica) is the main bottleneck. This is especially so in the dry tract of Bijapur district where the seasonal conditions are abnormal and erratic. The rainfall during kharif season when jowar is to be sown is not assured. Canal water is made available during the second fortnight of June and the crop fields actually get water during the first week of July. Hence early sowing of hybrid jowar in this tract is not possible. But it is an admitted fact that higher yields are realised if early sowing of hybrid jowar preferably before the end of June is done.

Madhav Rao and Shankar Gowda (1967) have studied the incidence of dead hearts and average number of fly eggs in hybrid jowar (CSH-1) when planting was conducted from March to 15th September with an interval of 15 days in 24 plantings and noticed very high incidence of dead heart in the crop planted on 15th July, 1st August, 15th August and 1st September. As stated earlier, the uncertainty of soil moisture and irrigation water necessitates sowing of hybrid jowar only in July.

Under these circumstances, it was

decided to study if sowing of hybrid jowar in July may be practicable in case some broad spectrum systemic insecticide is used to prevent conditions favourable for formation of dead heart and fly eggs. For this purpose two demonstration cum trials on cultivator's fields were tried during 1972–73 kharif season in Bagalkot sub-division in Bijapur district using Furadan a new broad spectrum systemic carbamate pesticide. The trials were laid out in one acre plot with the chemical in powder form(50%) for seed treatment and 3% granules active for application in the field. The control plot by the side was half-acre.

I Application (Seed treatment) :

For every kg. of jowar seed 100 gms of 50% powder was used. Three kg. seeds per acre was utilised. The seeds were put in seed dressing drum and 70 cc of water was sprinkled on the seeds. The drum was rotated for 5 minutes to soak the seed thoroughly. 100 gms of 50% SP. carbofuran for every kg of seed (i.e. 300 gms of chemical) was put over the seeds and the drum was again rotated for 10 minutes till the grains got coated with thin layer of the chemical. The sowing was done on the very day.

II Application in the field 25 days after sowing :

3% granules of carbofuran at 7 kg. per acre was applied 2 inches away from the crop at a depth of about $1\frac{1}{2}$ inches to 2 inches. Since, the chemical is highly poisonous and systemic, every care was taken not to inhale it or allow it to come into contact with the skin in one way or the other.

Both the trials were sown during July 1972 which is the peak period of fly attack.

Observations :

Periodical observations recorded were as under.

(i) 24 days after sowing (ii) 5 days after application of granules i.e. II application, (iii) 40 days after sowing (iv) 55 days after sowing are presented in table-1.

TABLE–I

Observations of incidence of dead heart

Observations % incidence of dead heart	Trial No. 1 at Bagalkot		Trial No. 2 at Gudur	
	Treated	Control	Treated	Control
(i)	19.4	58.2	16.1	52.3
(ii)	24.8	74.0	16.1	53.2
(iii)	24.8	77.8	16.1	54.4
(iv)	—	—	—	—

Fourth observation could not be recorded due to rainfall.

The crop was harvested on fourth week of October and first week of November, 1972 and the yield data are presented in Table–II

TABLE-II

Particulars	Date of sowing	Date of harvest	Yield/ acre in qtls Tre- ated	con- trol	Cost of chemi- cals Rs.	Addl. increase in yield per acre Qtls	Value at Rs. 100/- Qtls. Rs.	Cost benefit
1. Sri A. M. Shettar of Bagalkot	20-7-72	5-11-72	19-21	2-22	99.45	16-99	1699/-	1 : 17
2. ,, R. C. Patil of Gudur	17-7-72	28-10-72	12-15	1-12	99.45	11-03	1103/-	1 : 11

Conclusion :

It may be seen from Table–II that the application of 'Furadan' in hybrid jowar has shown encouraging results, leaving good margin of profit. Incidence of shootfly can be minimised and normal yield can be harvested with the application of the chemical even during the peak period of attack of pests.

Reference : A short note on the Bionomics and Control of Jowar fly (Sorghum News letter Vol. I, 1967)

V GLEANINGS FROM OTHER JOURNALS :

I) Mysteries of poor recovery of fertiliser Nitrogen

Crop production is greatly influenced by soil, climate and the system of cultivation. Although climate plays a dominating role, man cannot do any thing to modify it. Only soil can be manipulated to serve the purpose. Of the sixteen elements considered essential for plant growth and production, the absence or deficiency of any one of them makes it difficult for a plant to perpetuate life. Nitrogen is an indispensable constituent of every living cell in the form of protein and nucleic acid and thus governs growth, reproduction and heritability inspite of its being without life and inert in itself. Most plants (except legumes) obtain their nitrogen from the soil which is supplemented by fertilizer increments. Effective use of nitrogen fertilizers has become a major concern in present day farming. Crops seldom recover all the fertilizer nitrogen. From the farmers point of view, it is important to improve the recovery, for which it is essential to understand the causes and practices responsible for poor recovery. They are :

Leaching with water:

1 It is the main source of loss under field conditions all of which occurs in the form of nitrate nitrogen.

2 Nitrate moves with water from the soil surface to lower layers where it gets denitrified or lost in drainage or it may get accumulated.

3 In cropped lands, because of direct assimilation of the nitrate by the crop and reduced evapotranspiration the nitrate losses are much lower than that in fallow lands.

4 In arid and semi-arid regions there is little likelihood of losses by leaching except during periods of heavy rains within short periods.

Volatilization :

The gaseous loss of nitrogen in the form of ammonia from the surface of alkaline soil is referred to as volatilization. In recent years this loss has become more significant due to increasing uses of anhydrous ammonia, extensive use of urea and higher rates of nitrogen application.

The facts have been summarized below :

1 Losses are inversely related to exchange capacity, depth of application and directly to dryness of soil.

2 Appreciable losses may occur in alkaline or neutral soils if the ammonia form is close to the surface. Such losses further increase with temperature and drying of soil.

3 Losses increase markedly when the soil PH is above 7.

4 When the ammonia source, e.g., urea is applied as top dressing or on base soils, the losses of ammonia may be as much as 10–30 percent.

These volatilization losses can be reduced by deep placement of the fertilisers.

Denitrification:

The biological reduction of nitrate or nitrite to gaseous nitrogen is brought about by a number of species of facultative anaerobic bacteria :

1 Such losses are high in the rhizosphere due to uptake of oxygen by roots and micro-organisms feeding on root excretion. Some of them extract oxygen from nitrates or nitrites with accompanying release of gaseous nitrogen.

2 Presence ofactively decomposing organic matter in the soil increases the biological demand for oxygen and thus adds to denitrification.

3 Water logging by exclusion of oxygen induces denitrification, provided nitrates are present. Flooding of rice fields will therefore increase nitrification. Hence nitrate fertilisers should not be used in rice fields.

4 High pH favours denitrification. Any other condition which inhibits the diffusion of oxygen will induce denitrification.

Fixation of Ammonium :

4 to 6 percent nitrogen in the surface soil and about 50 to 60 percent in the sub-surface soil is held as fixed ammonium. This fixation in a non–exchangeable form is brought about by clays with an expanding lattice (Montmorillonite). The ammonium ion replaces cations like calcium, magnesium, sodium or hydrogen from the interlayer cations and are responsible for expanding the lattice of clay minerals. When an ammonium ion replaces these cations, the clay lattice contracts, entrapping the ammonium ion in a non–exchangeable form. The important facts of such a fixation are :

1 The fiixed ammonium can be replaced by expanding cations like calcium, magnesium, sodium and hydrogen.

2 The amount of fixation is related to the amount of clay in the soil, particularly of the expanding lattice type.

3 Clays with non-expanding lattices like illite and kaolinite have very low fixation.

4 Black and alluvial soils are rich in montmorillionite type clay minerals and thus have highest fixing capacity.

Management practices to reduce losses :

1. In moist soils ammonia forms ammonium which is retained by the exchange complex and thus leaching losses are reduced. Hence anhydrous ammonia should preferably be used in soils with percolating water and poor aeration.

2. Urea is rapidly hydrolyzed in the soils by enzyme ureas with a rise in

pH in the immediate vicinity causing volatilization of ammonia formed upon drying of surface soil. Hence urea should not be applied on surface and is better incorporated in the soil.

3. Ammonium nitrate contains nitrogen in two forms. Its use in well aerated soils has reduced volatilization as the ammonium part is retained by the soil exchange complex and nitrate moves with water. Under conditions of low aeration nitrate portion gets denitrified. Thus this best suited in soils with normal precipitation and good aeration. Here it can be used for top dressing but not in water logged fields.

4. Under soil conditions of excessive moisture ammonical fertilisers should be preferred to reduce denitrification. This is also true for soils having actively decomposing organic matter.

5. Ammonical fertilisers should be avoided for soils rich in montmorillonitic clays for reducing the fixation.

6. Deep placement of nitrogenous fertilisers reduces volatilization losses.

Source : Modern Agriculture, January-February, 1973.

2) Carbofuran versus shootfly damage in sorghum

Consequent to the introduction of new high yielding sorghum hybrids, the shoot fly problem has become more serious than it was in the past. The devastation by the shoot fly, Atherigona Varia Soccata sometimes overruns the best efforts of the farmer to control this pest. The shoot fly has generally been observed to attack the crop in late sown kharif in all the sorghum growing areas, than normally sown crops in rabi season and monsoon (kharif) crop in Tamilnadu. Where two crops of sorghum are taken in a year the damage is likely to be heavy in both the crops. The shoot fly sometimes causes damage to an extent that no grain can be harvested.

Jotwani et al have observed that carbofuran seed treatement (5% a.i) significantly reduced the shoot fly damage, conseqently enhancing yields of grain and fodder. Ganga Prasada Rao suggested that use of carbofuran seed treatment at the rate of 5 parts of the insectictde (a.i) on 100 parts of seed on a commercial scale.

A trial was laid out to evaluate the recommended use of higher seed rate and treatment of seeds with carbofuran at two concentrations in controlling shoot fly damage during kharif 1972 with 6 treatments and was replicated 4 times. CSH-1 sorghum hybrid was sown in mid July in order to have a medium to heavy level of shoot fly attack. The seeds were dibbled 15 cm apart along the rows which were laid 75 cm apart. Carbo-wax was used as

an adhesive for seed treatment at 200 ml for 100 kg. of seeds.

Observations were made on the number of fly eggs on 10 plants per plot on 7th and 14th day after germination. The healthy and shoot fly affected plants were counted on 7th, 14th and 28th day after germination and the percentage of dead hearts was worked out. Effective plant protection measures were undertaken to control the sorghum stem borer and gall midge in all the treatments.

It was seen that the various treatments did not have any influence on the number of fly eggs. Moreover, there was no relation between the number of fly eggs and the percentage of dead hearts. The percentage of dead hearts gradually increased from 7 th to 28 th day after germination in all the treatments. The cumulative percent of dead hearts were minimum (4.3) in plots sown with 5% carbofuran treated seeds followed by those sown to seeds treated with 3% carbofuran. The seed mixture 6 kg carbofuran treated seeds (5% AI)+4 kg untreated seed per hect. was found to be effective next to carbofuran on seed.

It may be seen from table given below that maximum yield of grain could be obtained with carbofuran seed treatment at 5% a.i. sown at 8 kgs/ha and this treatment was closely followed by untreated seeds sown at a higher seed rate of 12 kgs/ha. Use of higher seed rate in overcoming the damage by shoot fly has been advocated previously. However, the use of higher seed rate is much expensive in the case of hybrid seeds due to their high cost and this is a limitation in advocating this method for hybrid sorghums. Sowing a mixture of treated and untreated seeds was found to be next in efficacy as shown below :

Sl. No.	Treatments	No. of ear heads/plot	Yield of grain/plot (kg)	Yield of fodder/plot (kg)
1	Carbofuran treated seeds (5% a.i.) sown at 8 kgs/ha	54	2.17	12.25
2	Carbofuran treated seeds (3% a.i.) sown at 10 kgs/ha	60	1.47	13.31
3	Untreated seeds sown at 8 kgs/ha	41	1.42	8.56
4	Untreated seeds sown at 10 kgs/ha	41	1.33	8.56
5	Untreated seeds sown at 12 kgs/ha	53	2.09	10.25
6	Seed mixture of 6 kgs carbofuran treated (5% a.i.) + 4 kgs of untreated seeds	53	1.89	11.50

Considering the overall performance both in terms of insecticidal efficacy and increase in yield, it seems preferable to protect the seeds with carbofuran at 5% a.i. The benefit that accrues out of carbofuran treatment in terms of reduced infestation as well as enhanced grain and fodder yields as observed in the present study has also been reported elsewhere by Jotwani et al and Ganga Prasad Rao.

Source : *Agricultural Extension News, March 1974*

VI Research News

1 Grain shattering beyond 50% in rice is not desirable:

Many farmers in the tropics wait too long before harvesting their rice crop. The reasons are many. This delay results in grain losses due to shattering. However, reports of considerable grain shattering even with timely harvest in certain varieties are not uncommon.

Quantitative information on varietal differences, effect of time of harvest and other factors, chiefly climate, on the degree of grain shattering is lacking. From an agronomic viewpoint, grain shattering has apparently been overlooked in rice varietal improvement. Preliminary results of a study on some high yielding and local varteties are reported here.

Shattering was measured in the field using the method suggested by Chang and Bardenas*. The mature panicle was gently grasped by hand and a slightly rolling pressure was applied. The ratings are (i) tight-few or no grains removed, (ii) intermediate 25-50% of grains removed and (iii) shattering more than 50% of grains removed.

Twentyfive panicles in each variety were selected at random and subjected to rolling pressure by five persons each doing five panicles. The data are presented in table-I.

TABLE–I

Degree of grain shattering in some rice varieties.

No.	variety	Percent shattering Tight	Interme-diate	Shatter-ing
1	Ratna		45.57	
2	Suma			55.68
3	Madhu			58.38
4	IR-20		34.34	
5	Ch-45			60.14
6	S-705		47.55	
7	MTU-20		49.37	
8	S-137			54.62
9	T-65		26.76	

Note: Varieties 1–4 are high dwarf and semi-dwarfs. 5–8 are local talls and 9 is a ponlai.

It may be noted that grain shattering beyond 50% is not a desirable feature and it may make harvests in such varieties a little more unpredictable.

Further studies to evaluate a large number of high yielding dwarf and local varieties are in progress.

* *Chang, T. T. and Bardenas, E. A., the Morphology and varietal Characteristics of the Rice Plant, Tech. Bull. No. 4, The International Rice Research Institute, Philippines, 1965 : 29.*

2 JK-125-2 A new High Ginning Cotton Strain:

Ginning outturn is the proportion of lint by weight in seed cotton (kapas). This important character of cultivated cottons is usually expressed as lint percentage or ginning Percentage. In India, high ginning outturn of cotton gets a premium in the markets as most of the cotton is sold as Kapas and the grading of kapas depends upon its lint content. Secondly, unlike yield of kapas which is subject to wide fluctuations in environmental & cultivational changes, ginning percentage is relatively a more stable character especially under rainfed conditions of growth.

Standard cultivated cottons belonging to Gossypium Hirsutum L., species in India exhibit, in general, a ginning percentage of 34 to 37 and therefore, one percent increase in mean ginning outturn of a new variety is equivalent to 3% increase in lint yield, and hence its importance in the objectives of cotton breeding.

Two cycles of "recurrent selection" programme followed during the summer and winter seasons 1967 in the progenies of the cross CL 20xAcala 5675, pursued by subsequent intensive selection and inbreeding for five generations, has yielded high yielding and short duration cotton strains termed JK series. One of these strains, viz., JK-125 was found to exhibit a ginning outturn varying from 39.8 to 42.3%. In a detailed study of genetic architecture of economic characters of cotton, ginning outturn was found to be controlled by additive genes epistatic gene and action of the nature of recessive complementation in this particular cross combination (CL 20xAcala 5675), and therefore amenable for improvement by breeding procedures which would "mop-up" and conserve the additive gene complexes and provide true breeding strains.

Two cycles of inter se family crossing in JK-125 strain were undertaken during 1970 and '71 summer season. Further selection of individual plants in this inter se crossed (sister-brother crossed) bulk and subsequent inbreeding resulted in a very high ginning strain, JK-125-2. This exhibits a ginning out turn of as high as 44.6%, which is an increase of nearly 9.5% over that of Laxmi, a standard variety of cotton. Attempts to further improve the ginning outturn are in progress through inter se crossing.

In the progeny-row tests during 1972-73, JK-125-2 was found to give an yield of 560.9 g/row of 6 m length which gives an estimated yield of 1508 kg/ha under rainfed conditions. This strain possesses superior medium stapple length of 24.4 mm which is highly uniform (irregularity percentage 18.5) and fairly high fibre strength of 7.93 P.S.I. This strain is currently undergoing yield trial in three Southern States, Karnataka, Andhra Pradesh and Tamil Nadu under the All India Co-ordinated Cotton Improvement Project.

§ § §

3 A Cowpea Genotype with desirable Plant habit:

Dwarf, stiff strawed, synchronously tillering with high response to fertiliser application form the ideal 'Plant types' in graminous plants like wheat and paddy. Similarly, plants with diterminate habit, free from tendrills, early maturing and non-season bound could be visualised as hypothetically model plant type in leguminous crops.

Such types have high response to fertilizer application and maximise the production per unit area in unit time. Thus, they can bring about a much needed break-through in pulse production in our country. Such plant types have been obtained as result of an extensive breeding programme in the field–bean Dolichos lab-lab L. and in red gram (Cajanus cajan). In Cowpea, such an ideal plant type could not be obtained hitherto in any of our collections or segregating material. However, recently one strain from philippines has been introduced which possess all the attributes of a good plant type. This strain has been grown in all the three seasons at Hebbal and found to be day–neutral. The seeds are medium sized ivory–white and very attractive and are likely to have high preference in the market. The strain is erect and compact in its habit. Even at a very high level of nitrogen tried (60 kg/ha) it has not putforth any side branches which lead to heavy matting common in all the other varieties of cowpea. Further, erect habit of this variety allows for the agronomical manipulations involved in achieving high yields. This strain fits in a row spacing of 25 cm to 30 cm as against 45 cm to 60 cm needed for C–152, the present high ranking cowpea variety, enabling for high plant population per unit area. The strain is also earlier to C-152 by about ten days in maturity. It has got an additional advantage of long peduncles, bearing the fruits far above the ground level, preventing the fruit from rotting and also minimising the rodent attack. This strain is being rapidly multiplied and concomitantly tested with other varieties. Further, this has been extensively used in hybridisation programmes with other varieties which excel this variety in a few other characters like more number of seeds per pod, seed size, fibreless pods and other yield attributes.

Source : Current Research Monthly News Letter. April 15, 1974

VII News in brief

1. Utilisation of Oilseed meals and legumes for nutrional foods:

It is estimated that 140 million people comprising pre-school children, children in primary schools, pregnant women and the lactating mothers in India are malnourished due to want of enough protein in their daily diet. The cost of mal-nutrition to the country is made up of several components i. e., (a) the loss of future man power due to physical retardation in growth of young generation (b) hospitalisation and medication of the mal-nourished (c) loss due to death of mal-nourished children and so on and so forth. The effects of mal nutrition are irreparable as no amount of remedial measures at a later stage can help the victims. The mal-nourishment of the child between the ages of 6 months prior to birth upto about 3 years after birth is crucial and can affect the mental well being of the child. No country can afford to have large section of the population mentally retarded. Hence most of the developing countries of late have realised the magnitude of the problem of mal-nutrition and have taken up a number of projects to provide nutrition to the lower age groups of its population.

Use of oilseed meal as nutrition :

At the moment oilseed meals are used only for feeding cattle and to some extent as fertilisers. At the end of the Fifth Five Year plan, it is estimated that 11.2 million tonnes of oilseeds will be produced in the country. In India the major oilseeds are Groundnut, Cotton, Seed Rape and Mustard, Sesamum and Coconut. When oil is extracted from these oil seeds they form protein concentrates having as much as 40 to 50% proteins. It is only recently that work on the utilisation of oilseed meals as human food has been carried out. The results have been most interesting and exciting.

The usual type of oilseed meal that is produced is a product which can scarcely be utilised for the feeding of humans. The hygienic quality is highly suspect. Hence it cannot be used straightaway as human food. Most of the oilseed meals have anti-nutritional factors associated with them which prevents their use as such in human foods. In Groundnut, "goiterogenic" and "aflatoxin" factors are the two important anti-nutritional factors which have to be eliminated before it is used for human food.

In order to overcome these drawbacks, the C.F.T.R.I. at Mysore undertook a project and did

pioneering work in the production of groundnut flour of edible quality. It is this single contribution which has led to the utilisation of groundnut meal in the various formulations of food products. The maximum utilisation of oilseed meals in India has been in the production of foods for the Social Welfare projects. The first food that was developed by C.F.T.R.I. Mysore was a high protein food containing 75% of edible groundnut flour and 25% of bengalgram flour. This has a protein content of 42% and has been widely tested on children of different age groups. "Balahar,, which was also first developed at C.F.T.R.I. is another food which contains edible groudnut flour. At present projects are at hand to utilise cotton seed meal, rape and mustard meal and sesamum meal as human foods.

2) Utilisation of Pulses for nutritions foods:

We have a variety of pulses produced in the country which are used in our diets. India is the largest producer of bengalgram in the world. During 1971, India produced about 5.25 million tonnes of Bengalgram. Consumption of legume in our diet is also high being about 50.4 gms/day. This is the highest excepting Ceylon and some African countries. Legumes are an excellent source of lysine. However legumes are very little used in the diet of small children. This is because of the belief that legumes are not easily digestable by children. Supplementation of children food with pulses or legumes provide a highly acceptable taste and flavour. Nutritious foods based on legumes are now coming into market. The multipurpose food contains about 25% Bengalgram flour. Clinical trials with children of various age groups has shown that it is an excellent protein supplement for over-coming malnutrition. Some of the weaning foods on the market like Bal-Amul also contain adequate quantities of pulses.

(Excerpts of the paper presented by Sri M. R. Ramachandra, C.F.T.R.I., Mysore at the Seminar held under the auspicious of the Institution of Agricultural Technologists, Bangalore).

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3) New Fertiliser boon to farmers.

Releasing "Navaras", a liquid foliar fertiliser formulated and manufactured by Messrs. Panchajanya Enterprises, the Chief Minister of Karnataka said that the State Government would extend all possible help and encouragement to ventures designed to overcome the acute shortage of chemical fertilisers. The Minister for Agriculture. Sri N.Chikkegowda who presided said he made an experimental use of this foliar fertiliser on his farm and found it a good plant nutrient and commended its wider use for increased agricultural production. Dr. H. R. Arakeri, Vice Chancellor of the University of Agricultultural Sciences who spoke

on the occassion said this liquid concentrate of both major and minor elements of chemical fertiliser could prove highly productive if its application was preceded by a thorough analysis of the soil.

4) Package of practices for high yields for 1974 :

The booklet on Package of Practices for high yields for 1974 is under printing. The same will be ready for distribution by the end of May, 1974.

VIII DEPARTMENTAL NEWS :

a) Director's Tour

The Director of Agriculture was in Shimoga on 3.4.74 and participated in the Programme Planning Workshop of Bangalore Division for 1974–75, inagurated by the Hon'ble Minister for Agriculture. He left for New Delhi on 8.4.74 to attend the All India Plant Protection Seminar convened by the Ministry of Agriculture, Government of India. He attended the valedictory function of the Soil Conservation Training Centre at Mysore on 30.4.74, where he also held discussions with the Joint Director of Agriculture, Mysore Division with regard to various agricultural development programmes taken up for the year 1974-75. He also held discussions with the Administrator, Kabini, Hemavathi, and Harangi Projects, about the progress made in soil survey and land development works under these projects.

b) Schemes :

All the State Plan and Centrally Sponsored Schemes have been continued for a period of Six months on existing basis from 1.4.74 vide G.O. No. AF. A/167 ML. 73 dated 27.4.74. The non-plan schemes have also been continued for a period of Six months from 1.4.74 vide G.O. No. AF. 187. AGO. 73 dated 25-4-74.

c) Promotions and transfers :

The following Class II officers in the Department of Agriculture were promoted to the Junior Class I Cadre.

Sl. No.	Name and designation	Where posted
	Sriyuths	
1	G.Phanishayi, Agricultural Officer (Fertilisers) Bangalore.	Asst. Director of Agriculture, (Soil and Water Management) I.D.L.A.D., Doddaballapur.
2	A.Srinivasaiah, Agricultural Officer (Seed Development) Bangalore.	Asst. Director of Agriculture, (Fertiliser) Shimoga.

3	M.Ramakrishna Reddy, Agricultural officer (soil Testing Laboratory) Kolar.	Asst. Director of Agriculture, (Training) Farmers Training and Education Centre, Bhadravathi.
4	H.S.Shettappannavar, Agricultural Officer (Groundnut Extension) Haveri.	Asst. Director of Agriculture, (Fertiliser) Dharwar.
5	H.B.Ananda, Agricultural Officer (O.O.D) Small Farmers Development Agency, Mysore.	Asst. Director of Agriculture, (S.C.T.C) Somanahalli and allowed to continue in the Small Farmers Development Agency, Mysore.
6	Y.R.Muniswamy, Agricultural Officer (Soil Testing Laboratory) Mandya.	Asst. Director of Agriculture, Maddur, vice Shri.G.R.Prabhuswamy transferred.
7	V.Yalle Gowda, Agricultural Officer.	Asst. Director of Agriculture, (Plant Protection) I.D.L.A.D., Doddaballapur.
8	C.T.Muthanna, Agricultural Officer (Information) Bangalore.	Asst. Director of Agriculture (Farm Information) Bangalore (Upgraded Post)
9	M.Chandraiachar, Agricultural Officer (Seed Development) Mangalore.	Asst. Director of Agriculture, Puttur.
10	Shankar Rao Kulkarni, Agricultural Officer (Soil Testing Laboratory) Gulbarga.	Specialist (Plant Protection), Multiple Cropping, Sindhanur.
11	Shama Rao Kulkarni, Agricultural Officer (S.D.S.C.) Chincholi.	Asst. Director of Agriculture, (Project) Sindhanur.
12	Basanna R. Yadgir, Agricultural Officer (S.D.S.C) Gulbarga.	Asst. Director of Agriculture, Manvi.
13	Gulam Idris, Agricultural Officer (S.D.S.C.) N.R.V.P., Bidar.	Asst. Director of Agriculture and posted to Small Farmers Development Agency, Bidar.
14	G.Rama Rao Kulkarni, Agricultural Officer (Soil Survey) U.K.P.Krishnapur.	Asst. Director of Agriculture Jamkhandi.
15	Syed Habibulla Hussaini, Agricultural Officer (Seed Developement) Bellary.	Asst. Director of Agriculture, (Soil Survey) Upper Krishna project, Krishnapur.

16	Smt. H. A. Vishalaxi Rao, Agricultural Officer, (Chemical Analyst)	Asst. Director of Agriculture, (Soil Survey) Bangalore.

d) Publications, Extension Materials and Radio Talks :

Fortnightly seasonal tips for the benefit of farmers in the State for the month of May were prepared in consultation with the Specialists of the Directorate and sent to the Department of Information and Publicity and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme "Krishi Ranga".

Compiled by :

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farm front

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FARM ADVISORY AND EXTENSION SERVICES

DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

My greetings to every one of you who is a member of this great organisation. On my part, I consider it a rare privilege not only to be a member of this Institution but also be able to work with you for atleast a short period.

I am conscious of the fact that this Dapartment has a glorious past. There has been a succession of illustrious leaders in this organisation who have made notable contributions for the development of agriculture in the State. It shall be our combined responsibility to uphold the reputation of this organisation and make our own contribution for the growth of agriculture at this stage. I consider that opportunities for serving the farmers in the State are really excellent and enormous.

Never before in the development process in the country, a change promoting agency like ourselves had such a tremendous amount of technical information which can be made available to hundreds and thousands of farmers. The High Yielding Variety technology has entirely changed the face of farming in the country. New Technology in land shaping, water management, dry farming, fertiliser utilisation and plant protection measures is becoming available to the technical personnel of the department at a very fast pace.

Of course, we have a number of probelms right at the moment. For instance, an important production input like fertiliser is not plentiful. Fortunately for us, the situation need be taken as very alarming. The real fact is that the demand for fertilisers seems to have gone up steeply. Another related problem is the recent rise in cost factor of fertiliser. However, some of these problems are beyond our control. But it is possible for us to utilise this opportunity to work with the farmers to harness local manurial resources on the one hand and also utilise more efficiently the available fertiliser, on the other. Our efforts should be directed towards these ends in so far as fertiliser is concerned.

Some of the immediate tasks that should receive our attention are already well known. Distribution of fertiliser, of course is matter of priority. Allotment of fertiliser through permits has its own difficulties. Fertiliser cards, now being introduced perhaps would eliminate a good deal of criticism.

There may be other problems which we may have to face with the card system. On the one hand, the quantity of fertiliser allotted is comparatively low and on the other, instalments of fertiliser are too numerous. Lately the Government have indicated that we may reduce the number of instalments. This may give some amount of relief to the farmers and fertiliser dealers.

Another item which should receive our immediate attention is problem of seeds. While at a given point of time, supply of seeds has been adequate, there have been instances, where temporary dearth of seeds has developed. It is mostly a question of planning the utilisation of resources and work out logistics for the movement of resources from the point of availability to the point of utilisation. With experience, we should be able to overcome many of these problems.

With the onset of agricultural season, we should now devote full attention to the application of new technology as extensively as possible. An impression that may be lingering in some quarters that we are satisfied with the allotment of seeds and fertilisers to the farmers should be immediately removed. The main factor of production is neither seeds nor fertiliser alone but it is the technical information giving the know-how regarding the utilisation of seeds and fertiliser with greater efficiency. Therefore the information on new technology has to be made available to the farmers as quickly as possible. Many of our extension staff are well aware of this fact. Hence, it does not need any further emphasis. My only request is that we should fully harness our efforts and resources to see that information on new technology reaches the farmers as quickly as possible along with the seed and fertilisers.

Dr. R. Dwarakinath
Director of Agriculture

II How the previous month was

(Seasonal and crop conditions during May 1974)

Fairly good showers were received in many parts of the State. Temperature was below normal during the month. The condition of the standing crops was satisfactory. Sowing of kharif crops like hybrid jowar, Hybrid maize, Sea island cotton, drill paddy, etc. was in full swing. The agricultural situation in brief for each division is given below:

Bangalore division :

Good rains were received in Bangalore, Chitradurga and Shimoga districts, where as passing showers were received in Tumkur and Kolar districts. Sowing of hybrid jowar, hybrid maize, sea–island cotton, harvesting of summer paddy, groundnut, hybrid jowar and hybrid maize, transportation and incorporation of farm yard manure, preparatory cultivation for sowing of kharif crops were some of the major agricultural operations carried out. There were no reports of incidence of major pests and diseases.

Mysore division :

Fairly good showers were received in the districts of Mysore, Mandya, South Kanara and Hassan. Scattered showers were received in Chickmagalur and Coorg districts. Important agricultural operations carried out were sowing of hybrid jowar, Sea–island cotton, hybrid maize, sunflower and green manure crops, raising of paddy nurseries, carting of tank silt and farm yard manure, preparatory cultivation and harvesting of sugarcane. Blast and stemborer on paddy, shootfly on hybrid jowar in patches were noticed against which necessary plant protection measures were taken up.

Belgaum division :

Dry and hot weather prevailed in Bijapur district, where as fairly good showers were received in North Kanara, Belgaum and Dharwar districts. Major agricultural operations carried out were, sowing of hybrid jowar, drill paddy, 170–CO2 variety of cotton, top dressing and earthing up of sugarcane, hybrid jowar, and hybrid bajra and preparatory cultivation operations for raising of paddy nurseries. There were no reports of incidence of pests and diseases.

Gulbarga division :

Good rains were received in Bellary and Raichur districts. Dry weather prevailed in Bidar and Gulbarga districts. Sowing of hybrid jowar

top dressing and earthing up of sugarcane, harvesting of summer crops like paddy, hybrid jowar, hybrid bajra, and groundnut, preparatory tillage operations for sowing of kharif crops and carting of farm yard manure were some of thc important agricultural operations carried out. There were no reports of incidence of major pests and diseases excepting shootfly on sugarcane, against which necessary control measures were taken up.

INPUTS FOR FARMERS :

Fertilisers :

Efforts need to be intensified in the distribution of fertiliser cards to the cultivators. Special attention has to be paid for the preparation and processing of cards. Malpractices are bound to arise. There is therefore need for constant watch to prevent misuse of cards and to check and scrutinise the cards held by the farmers.

I) Role of farm yard manure and its importance in agriculture

G. M. Mruthyunjaya, AAO, (Farm Information) Bangalore

Farm yard manure is the oldest manure used by our cultivators ever since they took to agriculture. It has stood the test of time and is still the most popular of all organic manures. Its importance has assumed greater significance in the context of shortage of chemical fertilisers in the country. It consists mostly of vegetable substances mixed with animal dung and urine. It therefore contains all the elements present in the soil itself and it helps in resorting to the soil the ingredients removed from it by the crop.

The preparation of farm yard manure offers one of the best means of utilising farm and other agricultural wastes and simultaneously production of humus in which most of our soils are deficient. The importance and value of this manure has been recognised of late in our country. Due to improper handling, storage, use, etc., the plant nutrients present in it are wasted. In a number of experiments carried out throughout the country, it is revealed that increased yields ranging from 10-60% could be obtained. Better results can be obtained when farm yard manure is used in combination with other cultural practices, such as improved seed, inorganic fertilisers etc., which constitute good soil management.

Composition of farm yard manure :

Farm yard manure is made up of three types of substances, namely, the solid excreta or dung of farm animals, the liquid excreta or urine, and straw or other vegetable refuse used as litter. Its composition varies according to the composition of these substances and the proportion in which they are present.

Average nutrient content of the dung of the farm animals is as follows:

	Cattle	Buffalo	Horse	Sheep	Pig	Poultry
Water	82.4	81.1	76.5	61.7	80.7	57.0
Organic matter	15.2	12.7	21.0	33.1	17.0	29.3
Mineral matter	3.6	5.3	3.9	4.7	3.0	—
Nitrogen	0.3	0.26	0.47	0.70	0.59	1.46
Phosphoric acid	0.18	0.18	0.30	0.51	0.46	1.17
Potash	0.18	0.17	0.30	0.29	0.43	0.62
Lime	0.36	0.46	0.17	0.46	0.09	—

(Source : Hand book of Manures & Fertilisers)

As can be seen from the table it is observed that poultry manure is the richest of all. It is highly concentrated, containing the largest amounts of organic matter and the three major plant nutrients. Sheep dung comes next, but it is poor in potash. Cattle and buffalo dung contain the largest amount of water and the poorest in major plant nutrients when compared to poultry manure.

Value and functions :

Farm Yard Manure plays a very important role in Agriculture. Its value is many sided. It supplies plant nutrients, improves the physical condition of the soil, and encourages soil-microbial activity. As it contains materials derived from vegetable substances it supply all the major as well as minor elements to the crop. Farm yard manure however contains very small quantities of these elements. This is more so in case of the three major nutrients namely nitrogen, phosphoric acid and potash.

Average composition of farm yard manure is as follows :

Organic matter	31.67%
Mineral matter	73.40%
Nitrogen	0.93%
Phosphoric acid	1.00%
Potash	1.31%
Lime	5.74%
Magnesium	1.13%
Organic carbon	11.84%
C–N Ratio	9.50%
P. H. value	7.36%

(Source : *Hand book of Manures & Fertilisers*)

At the rate at which it is normally applied to the soil, the quantities of N, P and K supplied by the manure are not sufficient to ensure a high level of crop production. Besides only a small fraction of these nutrients is immediately available for the requirement of the crop. However the farm yard manure is a good source of micronutrients. It contains copper, zinc, manganese and Boron. The value of farm yard manure lies more in the organic matter or humus that it contains. It is through humus that it exerts a profound effect on the physical and physico–chemical properties of the soil. With the improvement in structure, other physical properties, such as areation, permeability, drainage and resistance to erosion are improved. It regulates the soil temperature. It improves the water holding capacity of the soil, and delays the fixation of phosphoric acid in soil.

The addition of farm yard manure helps to increase soil fertility by creating chemical and physical conditions more favourable to the activities of the soil micro organisms. As a result of microbial activities large volumes of Carbon-dioxide are evolved which on solution in soil water, bring insoluble soil minerals into solution. Farm yard manure thus helps to increase the quantity of available plant

nutrients in the soil. By virtue of all these properties farm yard manure creates conditions for the successful use of chemical fertilisers. Another important feature of farm yard manure is its residual value. The residual effect lasts for two or three years before the effect of the manure is fully exhausted.

Usual method of preparation :

The usual method of preparing farm yard manure by our farmers is very crude and inefficient. The common practice is to throw cattle dung and other farm refuse into a pit specially dug for this purpose. The quantity of dung utilised for purpose is comparatively very little. Major portion of the dung is utilised as fuel. The dung added to the pit is not uniformly mixed with urine and litter. Atmost the whole of cattle urine which is rich source of nutrients is allowed to go waste and there is no attempt by our farmers to collect it in a systematic way.

Method of preparation of good quality Farm Yard Manure:

1 Prepare a pit of suitable size.

2 Make the maximum use of cattle dung, urine and vegetable wastes.

3 Spread the materials evenly in the pit, wetting them with water if necessary, each time.

4 Protect the material in the pit form rain and sun.

The pit should be neither too big nor too small. The convenient size of the pit is 6 feet wide and 3 feet deep. The length may depend on the quantity of material expected to be put every day or during a season. It is better to have two or three small pits than a single pit. The pit should be located at a site not likely to be submerged due to runoff or flooding. All the dung and urine voided by animals should be scrupulously collected and utilised. One of the best ways is to spread some vegetable material of good absorbing capacity as litter or bedding for the animals. If it is not possible, a layer of loose earth spread under the feet of cattle will serve the same purpose. The earth soaked with urine should be scrapped and removed to the manure pit every week or fortnight and spread evenly over the other materials. All farm wastes, like stalks, stems, leaves and ash should be collected and added to the pit after mixing them properly with dung and urine. The various materials so collected should be spread in the pit layer by layer. The material, if dry should be watered so as to keep it moist, but not wet. The pit has to be protected from rain and sun. This can be done by providing roof over the pit.

Use and effect of Farm Yard Manure:

Farm yard manure can be applied to all crops and all types of soils. Its utility will be greater when there is adequate moisture in the soil. It requires sufficient time about two to four weeks before sowing, when the plant nutrients contained in it are converted into an assimible form. It is of little use if it is applied too early, as some of the soluble plant nutrients are likely to be lost by leaching in rainy season or by volatilization during hot weather.

It should be spread evenly in the field and mixed in the soil immediately, instead of putting it up in small heaps.

The quantity to be applied to the soil is governed by the environmental conditions. For crops grown in dry areas, where the rainfall is less than 76 cms, 7 to 12 cart loads of manure per hectare are sufficient. When sufficient farm yard monure is not available it may be applied to a part of the field, every year, so that it covers the whole field every three or four years.

Fresh farm yard manure, should not be used as it has a wide C-N ratio and lacks sufficient soluble nitrogen to meet the requirements of the micro-organisms to decompose the large amount of carbonaceous material. Hence they utilise the nitrates and other soluble nitrogenous compounds present in the soil and compete with the growing crops. If fresh farm yard manure has to be used it must be applied sufficiently in advance to allow proper decomposition.

The effect of farm yard manure varies with the quantity and quality of the manure applied, time and method of application, crop to which it is applied, and other factors, such as water supply. In general farm yard manure when properly used gives moderately increased yields.

Reference : 1) *Principle of Crop Husbandry in India by Sri A. K. Yegna Narayan Aiyer.*

2) *Hand Book of Manures and Fertilisers.*

3) *Hand Book of Agriculture.*

4) *Priciples of Agronomy by Sri T. V. Subbaiah Mudalior.*

2) Use of rhizobium culture to increase the yield level of pulses

T. V. Basavaraj, JDA (Pulses), Bangalore

Horse gram, Redgram (Thogary), Bengalgram, Greengram, Blackgram, Cowpea, Madki, and Avare (Lab-lab) are the major pulse crops grown in Karnataka. The area and production are approximately 10.7 lakh hectares and 4.64 lakh tonnes respectively per year. But the requirements of pulses are estimated at 8 lakh tonnes every year. Therefore the necessity to increase the production of pulses is keenly felt.

Use of Rhizobium culture is one of the sure and simple methods of increasing the yield level of different pulse crops. 10–15% increase in yield has been recorded in case of Bengalgram in All India co-ordinate trials conducted in recent years. Thogary has recorded increased yield in many centres. Application of Rhizobium culture will not have any adverse effect on the pulse crops. Even in traditional areas Rhizobium culture may be used for Thogary.

Rhizobium bacteria can not be seen by naked eyes and could be seen with the help of a microscope. They enter the body of the deguminouse plants through root hairs and establish themselves in colonies in small room like apertures called root nodules. The bacteria in the root nodules will fix up atmospheric nitrogen. This nitrogen is converted into amino acids, which is important in the preparation of proteins by the plants. The fixation of atmospheric nitrogen depends on the nutrient status of the soil, PH value, density and effectiveness of the bacterial culture and also on the duration of host plant.

In the case of grain legumes the amount of nitrogen fixed is estimated to be 40–100 kgs./hectare. In case of (Redgram) Thogary the fixation of 'N' is estimated at 96–150 kg./hectare crop. Therefore in these days of shortage of fertilisers, use of Rhizobium culture can supplement requirements, of 'N' to some extent, in respect of pulse crops.

Different pulses crops requires different strains of Rhizobium. Some are nodulated by wide range of strains. Therefore only recommended strains may be used for specific crops. It is advisable to apply bacterial culture to the seed before it is sown. The seed meant to be sown for the day, may be soaked in water for a few minutes and the water drained. The bacterial culture linguite peat based may be made into a water slurry with 5-10% sugar or jaggery solution. Some neutral white gum may be used in place of sugar or jaggery

solution. The gum helps bacteria to adhere to the seed coat firmly. The seeds and the slurry are to be well mixed with clean hands and spread over a cloth in shade. Another method would be as under: The seeds meant for sowing for the day will have to be dipped in water and taken out. A clean gunny cloth or polythene sheet may be taken and seed will have to be kept on the gunny bag polythene sheet. The bacterial culture mixed with jaggery solution may be poured on the seed. The two ends of gunny cloth/polythene sheet may be held by two persons. The seed on the gunny cloth/polythene sheet may be rolled, by raising the ends of the gunny cloth alternatively.

Rolling has to be continued for a few minutes to see that some particles of the culture are found sticking on each seed. The innoculated seed may be kept in shade by spreading it on a cloth. The treated seed should be used on the same day. Seed treatment with fungicides like captan, ceresan and Brossicol first followed by seed treatment with Rhizobium was found to have no adverse effect. 250–300 grams of Bacterial culture would be sufficient for one hetcare.

The inoculated seeds can be covered with fairly ground wet lime (passing through 300 mesh) in large trays or roller drum. Lime pelleted, inoculated seeds are recommended for acid soils. (N. S. Subba Rao).

Phosphates facilitate the growth of Rhizobium culture and aid in efficient use of nitrogen by the plants. Normally cultures remain active for about 3 months under regrigerated condition and can be kept for about 2 weeks under ordinary conditions. Therefore care should be taken to use the culture within the date of expiry.

In addition to seed inoculation method, soil may also be treated with Rhizobium culture. 250–300 grams of Rhizobium culture will have to be mixed with the same quantity of farm soil. Some water has to be added and mixed well.

Some more soil is to be mixed to make the mixture about 125 kgs. Some quantity of well rotted farm yard manure may be mixed and the mixture may be broadcasted over an hectare plot.

The Rhizobium culture may be obtained from Professor of Agricultural Microbiology, University of Agricultural Sciences, Hebbal, Bangalore–24 and Division of Microbiology, Indian Agricultural Research Institute, New Delhi–12. The Rhizobium culture meant for redgram, greengram, cowpea and blackgram are available with Professor of Agricultural Microbiology, University of Agricultural Sciences, Hebbal, Bangalore-24. The quantity of seeds to be treated or area in acres variety to be treated, type of soil where the seed is proposed to be sown, had to be intimated about 15 days in advance to the University of Agricultural Sciences, Bangalore.

I) Why Soyabean doesn't germinate fully ?

Both farmers and researchers have found a big defect in cultivating the otherwise excellent varieties of soya–bean introduced in India.

Their experience has been that in spite of a very high seed rate a good part of the seed does not come out of the ground. The crop stand is therefore poor and results in poor yields.

Complex problem :

Emergence of the young plant from the ground depends on many factors. Date of sowing, variety sown, quality of seed and pesticides used all have a bearing on it.

Add to these soil temperature and moisture, and the problem becomes more complex.

To find a way out, U P Agricultural University, Pantnagar, took up labo–ratory and field studies. The results have so far thrown a good deal of information on the why and how of the problem.

Bad weather :

Soyabean seeds produced in many parts of the country have a larger percentage of wrinkled, ruptured shrunken and small seeds.

Unfavourable weather in the develo-pment and ripening period, or exposure to damp after the pods are mature, may cause damage and produce inferior seed.

Such seed will have poor germination and seedling vigour. They lose their quality faster in storage than smooth and bold seed.

Only when the seed is of uniform size do you get good germination and an even crop stand. Hence only processed seed which is bold and smooth and free from damage and small seeds should be used for sowing.

Stores badly :

The storage ability of soyabean seed is not good compared with cereals. When the seed is stored at room temperature the heat and high humidity experienced in May–June rapidly reduces its germination quality.

The moisture content of the seed has to be brought down to 10% or less to ensure high germination.

Experiments show that seed treat–ment with fungicides such as Captan or Thirum increases the germination capacity by 10-12 percent. The increase

is more when the seed is of poor quality.

Soyabean seed gets a number of disease germ on its surface, and these cause diseases even before the seed germinates.

Seed treatment thus ensures that diseases do not reduce germination and the stand of the crop. Such treatment has no effect on the formation of root nodules.

The seed should therefore be treated with fungicides any time between harvest and planting, preferably before storage.

Sowing depth:

The depth to which seed is sown has an effect on the number of seedlings that come out. Three to five cm is about the maximum depth from which soyabean can come out successfully in most soils.

The ability to come out from deep planting differs with varieties, and is influenced by soil type, temperature, soil moisture and other factors, but all varieties come out slowly when planted deep.

Soyabean germination is best when soil moisture is 40-50%. Even with a high soil moisture deep sowing reduces the emergence of plants.

Where soil moisture is not enough it is better to wait for moisture rather than plant the seed deep.

If sowing is followed immediately by rain, crusting and compaction of the soil can result in complete failure of the crop. The germinating bean is unable to break through the crust of the soil.

You may see the thickening of the stems of the plants that emerge in such cases, as also when the soil is made compact by frequent and heavy rains.

A light hoeing may help the crust and enable the seedlings to emerge.

In kharif, when the chances of frequent rain planting time is common and enough moisture is found in the soil, it is better to plant seeds shallow.

Source: *Farmfare, April 1974*

2) Take care of row spacing in Sorghum

One of the indispensable factors in tailoring the recommended plant types is to fix the optimum number of plants per unit area so that the production per unit area can be increased enormously. Moreover, this factor would also be equally helpful in scheduling fertiliser level and irrigation requirements.

Considering the impact of these factors in production technology,

investigations were undertaken during the kharif seasons of 1969 and 1970 for studying the performance of sorghum CSH-1, CSH-2 and Swarna under 3 row spacings (23, 46 and 69 cms) and three plant populations (90,000, 136,000, 272,000 plants per hectare) at the farm of the Agricultural College, Indore as a part of the All India Co-ordinated Sorghum Improvement Scheme. Split plot design was used in four replications, keeping entries as main plot, row spacing as sub-plot and plant population as sub-sub-plot treatments. The net plot sizes were 11.0 and 13.8 square metres in the first and second year respectively. The net yields were evaluated from harvesting the central 12, 6 and 4 rows of the 23, 46 and 69 cm treatments respectively. The crops were sown on 8th July in the first year and 26th June in the following year. The crops were harvested at different dates according to their maturity period. Necessary after care in the form of cultural operations, pest and bird control was given at the appropriate time. The fertiliser doses were 100 kg N, 60 kg. P_2O_5 and 40 kg K_2O per hectare as per general recommendations. Half the dose of nitrogen was applied one month after sowing while the rest was given as a basal dressing. The desired plant population in the field was actually maintained by thinning at two different stages, i. e., 14 and 21 days after the sowing.

Spectacular response in yield potential was noticed by modifying row spacing during both the years. The wider row spacing of 69 cm manifested the highest grain and fodder yield during both the years. However, it could not maintain a significant increase in grain and fodder yield over the narrower spacing of 23 cm in the first year only. Each higher spacing indicated a significant increase in grain yield over its lower spacing in the ascending order in the following year. In the case of fodder yield significant superiority was not exhibited, but the yield trend was alike. The data made it quite obvious that wider spacing was more effective for higher production both of grain and fodder in comparison to either medium or narrow row spacing. This was due to the fact that plants narrowly spaced had greater competition for food nutrition, moisture, light, etc., Individual cob size was also observed to be reduced on visual observation which indicated less favourable growth conditions.

Increase in the yield of grain and fodder were also observed with the increase in the plant population on both the occasions. However, significant response was noticed only in the second year in which case each higher level was significantly superior to its preceding lower level both in case of grain as well as fodder yield. Such consistent trend reveals the superiority of greater plant population per unit area for higher production and which also conveys that crowding plants within the rows does not affect the growth and development of sorghum any more. But narrowing rows definitely induced deleterious effect in yeilding capabili-

ties. From the above findings, it is quite obvious that it is mainly the row spacing which plays vital role in controlling production potential irrespective of any plant population. As a matter of fact, it would be preferential to maintain higher plant numbers within the rows but the row spacing should be kept wider.

Variety × row spacing interaction for the yeild of fodder was significant during the kharif season of 1969. Highest yield record was observed with 'CHS-2' both at 23 cm and 69 cm over the 46 cm row spacing. Variations in row spacing in 'Swarna' did not indicate significant differences in the yield of fodder.

Wider row spacing (69 cm) and higher plant population (2.72 lakhs per hectare) in general, were found preferable over the narrower spacings or lower plant population both for grain and fodder yield. Hybrid 'CHS-2' had higher fodder yield potential both at 23 cm and 69 cm row spacings. The fodder yield in 'Swarna' remained unaffected by the variation in the row spacings.

Source: *Agricultural Extension News, April 1974*

3) Improvement in Rice Processing

Improvements in the post-harvesting operations of drying, milling and storing rice go a long way in augmenting food shortages. Research on rice technology is done at the Rice Research Station, Cuttack, the Central Food Technological Research Institute, Mysore, the Jadavpur University and the Aduthurai Rice Research Station, Madras, besides other centres of agricultural learning in India.

Modern rice mill includes, parboiling units, paddy cleaners, mechnical driers and power generators. The rice is weighed and packed by automatic machines and stored in silos with laboratory facilities to ensure quality control. The mill houses a complex array of machinery : Rubber roll-shellers, husk, paddy ahd rice separators, polishing cones and a blowing machine, which recover broken rice from the bran. First a cleaner removes metal pieces, grit and stones from the rice.

A co-ordinated system of elevators conveys paddy grains from one unit to the other in the mill. The paddy is fed into two small and compact, soft and resilient rubber rolls moving at different speeds. The husk is split by the abrasive action leaving the rice tip intact. The damage to the grain is negligible.

Some of the new mills are also equipped with parboiling units. The paddy is soaked in hot water and steamed to eliminate bad odours. This hardens the grain reducing the chances of breakage in milling. This method conserves vitamins, proteins

and minerals. Mechanical driers blow hot air over the grain to bring down its moisture content. The uniform drying results in a better milling out-turn. Moist grain rapidly deteriorates in quality. A mechanical drier works round the clock and is not subject to the vagaries of weather.

The rice is stored in various types of soils reinforced with the cement concrete or steel. These help to prevent losses due to rodents, birds, pilferage, etc. Silo storage takes up less land than the shed conventional store. They permit easy fumigation and aeration. The saving in food grain justifies the slightly higher cost of silo construction. Storage engineers are now working on lowering the initial cost of constructing silos.

Seven pilot rice-milling plants have been set up. They have been designed on the German and Japanese pattern. They are located at Thiruvanur (Madras), Mandya (Karnataka), Tadepallegudam (Andhra Pradesh), Raipur (Madhya Pradesh), Bagarh (Orissa), Memari (West Bengal) and Bikramganj (Bihar). These are run by the co-operative societies except for the last one which is managed by the Government of Bihar. Twenty-four more modern mills of Japanese origin are being set up by the Food Corporation of India. There will be no need to import any machinery for future programmes as indigenous components of modern rice-mills have already appeared in the market.

On the whole, modern mills yield 2.5% more rice than the sheller units and 6.6% over the huller units. Another advantage of the modern mill lies in the utilisation of bye-products. Bran obtained from these mills is free from husk and is suitable for extracting edible oil. Fine broken rice from modern mills can be used to make idli, dosa etc.

The Central Rice Research Institute is mainly concerned with the breeding and cultural development of improved varieties of rice. The Indian Institute of Technology at Kharagpur is engaged in the engineering aspects of rice processing. The Jadavpur University is dealing with the problems relating to parboiling and drying of paddy. The Storage Research and Training Centre at Hapur is conducting research and training in the field with particular, reference to eradication of insect damages and maintenance of the quality of grains in storage. The Central Food Technological Research Institute, Mysore is doing useful work in the biochemical processing aspects of rice.

(Source : Farmer and Parliament, December 1973)

Some new promising protein-rich cowpea varieties :

Pulses are the major protein supplements in human food. Cowpea is one of the widely cultivated pulse crops in Karnataka occupying an area of over 40,000 hectares. Five cowpea varieties developed and found to be promising at the International Institute of Tropical Agriculture, Ibadan, Nigeria (Africa), were introduced to this University by the Division of Agriculture Botany, Hebbal, Bangalore through the courtesy of Dr. P. N. Mehta, Director of the Institute. These are reported to have high stability index and have been found to be performing well at Bangalore conditions. These introductions and four local cultivars were tested for their bean protein content by micro-kjeldhal method. For each variety the estimation was repeated four times with randomly chosen samples obtained from three replications of the crop grown under similar agronomical conditions. The average percentage of protein is presented in Table-I.

TABLE-I

Mean percentage of protein in the cowpea varieties

Sl. No.	Variety	Mean percentage of protein
1.	Yard long	28.75
2.	New Era	26.38
3.	Lalita	25.42
4.	West Bred	25.39
5.	Local	25.22
6.	Iran grey	25.21
7.	K-I	25.41
8.	Pale green	24.49
9.	Pusa Do-phasli	23.09
	C. D.	0.504
	C. V.	12.28%
	S. E.	+−0.525

Highly significant differences were noticed among the varieties tested for their protein content ranging from 23.09% to 28.75%. The highest percentage of protein viz., 28.75 was recorded in the variety *yard long (Vigna sesquipedalis)* which is a vegetable type having tender long pods with sparse seed filling. The variety *New Era* which is an introduction is the next best recording 26.38% protein. However it is having greyish black seeds with less consumers preference. This was followed by *Lalita* and *West bred*, the other introduced varieties containing 25.42 and and 25.39% protein respectively. Their seeds are attractive light brown. Another introduction *Iran grey* and the cultivated varieties K-I as well as local type were on par with Lalita and West bred. *Pale green*, an introduced variety and Pusa *Do-phasli* which is released for general cultivation throughout the country recorded low protein viz., 24.49% and 23.09% respectively.

The study revealed that considerable variability for protien content exists in the varieties. While breeding cowpea for high yield, emphasis need to be laid on the concomitant improvement in protien content and seed colour.

Cereal crop fields should be weed-free for the first 4-6 weeks after sowing to ensure good yields :

Weeds are known for their competitive habit in the field crop especially under irrigated farming where high fertilizer applications are followed. They grow more luxuriently than crops and rob off the nutrients and space and hinders the normal growth of crop plants. It is also known that weeds emerging late in the season are less competitive with plants. In order to find out the critical period of weed-free environment on some cereal crops, an experiment was conducted during kharif 1972 on three crops–sorghum, bajra and rice at the Agricultural Research Station, Siruguppa. Weed-free environment for specific period was provided with hand weeding and compared with unweeded control and the weedicide treated plots. Crops were raised under recommended package of practices under irrigated conditions.

Data on grain yield (Table I) have indicated that bajra is more sensitive to weed competition than sorghum or rice. If the plots were free of weeds for 30 to 45 days after sowing in cereals or transplanting in case of rice, there were no appreciable yield losses. There was reduction in yield on an average of 5, 10 and 15% if the weed-free environment was provided to the cereal crops for 30, 20 and 10 days after sowing. Weed-free environment upto 45 days after sowing was almost as good as chemical weed control (use of proper weedicides) and the weed-free environment provided throughout the life period of crop.

It may be observed that for cereal crops, seedling growth stage is very critical for weed competition and any practice either manual or chemical that checks weed growth for the first 4-6 weeks after sowing definitely helps to raise successful crop.

TABLE I

Effect of weed-free environment on yield of some cereal crops

Sl. No.	Treatments	Sorghum (CSH-3)		Bajra (HB-4)		Rice (Jaya)	
		grain yield q/ha	percentage increase or decrease over weed-free treatment	grain yield q/ha	percentage increase or decrease over weed-free treatment	grain yield q/ha	percentage increase or decrease over weed-free treatment
1	Weed–free sowing to harvest	59.37	—	33.75	—	57.23	—
2	,, 1–10 days	49.12	—17.27	27.50	—18.52	50.24	—12.22
3	,, 1–20 days	52.50	—11.58	29.04	—13.16	52.37	— 8.49
4	,, 1–30 days	56.58	— 4.70	32.58	— 3.47	54.29	— 5.14
5	,, 1–45 days	51.42	— 1.61	33.33	— 1.25	57.44	+ 0.37
6	Unweeded control	31.62	—46.75	11.46	—66.05	45.39	—20.69
7	Hand hoeing twice	42.29	—16.98	28.20	—16.45	53.97	— 5.70
8	Chemical weed control	58.62	— 1.27	32.79	— 2.85	57.71	+ 0.84
	C. D. at 5%	1.56	—	2.309	—	0.965	—

VII News in brief

Sea island cotton pragramme in Mysore division during 1974-75

Sea island cotton is an extra long staple cotton regularly grown in the districts of Mysore, Coorg, Hassan, Chickmagalur and Shimoga for the last 12 to 15 years and is coming-up well under rainfed conditions. This variety has a fibre lenth of 1.25 inches to 1.37 inches, ginning out-turn of 32 to 33% and is suitable for spinning 70 counts and even more under mill conditions. Indian Textile mills at present are depending on the import of long and extra long staple cotton to meet the demand for fine and super-fine cloth. Our country even though is self sufficient in the production of short medium staple cotton, is importing long and extra long staple cotton to an extent of 7 to 8 lakh bales at a cost more than 100 crores annually imposing a heavy drain on our slender foreign exchange.

The Sea Island Cotton Development scheme of the Department of Agriculture is doing its best to popularise this variety in the above districts. During 1973-74 it was possible to cover an area of 12,500 acres in the State and in Mysore division 8,025 acres. During the year in Mysore division, 318 quintals of seeds, 1,883 tons of fertilisers and Plant Protection Chemicals comprising of 23,238 litres of liquid formulation, 20,772 kgs of powder have been distributed. 36 Composite demonstration plots, 17 trial with SIC+Giza-7+MCU-5+MY-14 and 33 composite demonstration plots at the cost of Small Farmers Development Agency, Mysore were laid out successfully and the results obtained are most encouraging. Training programmes to the staff as well as to the Farmers on the cultivation of this crop were conducted. A number of field days were also organised. Crop loan to the tune of Rs. 1,21,730/- had been advanced. The total production of kapas is 4,48,645 kgs in the division. The cultivators got a rate of Rs. 500/- per quintal at the time of delivery of kapas.

During the current year the programme has been drawn to cover 25,000 acres in the State and in Mysore division 13,000 acres, and to distribute 520 quintals of seeds, 745 tons of fertilisers and Plant Protection Chemicals, comprising of 8450 litres of liquid formulations and 65,000 kgs of powder formulations. It is programmed

to lay-out 56 composite demonstration plots and 240 soil test crop response trial plots. Arrangements have been made to stock the required quantity of seeds in all the districts. Out of the programme of 13,000 acres to becovered in the division during this year, Mysore district is aiming to cover 5,500 acres, Coorg district 1,500 acres, Hassan district 5,000 acres and Chickmagalur district 1,000 acres. There is always good market to this cotton and this year's produce will definitely fetch better price than the previous year.

2) Minikit Programme in Karanataka State

The Minikit Programme was first introduced in Karnataka State in the year 1970–71 on paddy. It was Subsequently tried on millets during kharif 73–74.

The object of the programme is to try new pre-release varieties in different Agro Climatic regions.

Minikt trials are of much national importance and on the performance of these new pre-release varieties in different regions with regard to their yield of both grain and fodder, cultivator response, market acceptibility, will largely depend the release of these strains on all India basis or in specific regions where their performance is found to be outstanding. Through these minikit trials the Government of India expect to release only the strains which will readily accepted by the farmers and which will spread of their own with the minimum of propagonda at various levels. Also through these trials, it is intended to withhold from release those varieties which have no merits except yield and which are likely to be abandoned by the growers as soon as the persuation and incentives are with–drawn.

In Karnataka State the Minikit trials were conducted in different districts on crops like, Rice, Hybrid maize, Ragi, Hybrid bajra and Greengram.

3) Farm incomes :

The country's income from crop production in the decade ended 1970-71, showed an increase of 141.6%, from Rs. 5825 in 1961-62 to Rs. 14070 crores, according to a study on the distribution of agricultural income in India.

The study reports that Punjab recorded the highest rate of income growth at 244.2% followed by Haryana, Maharashtra showed the lowest rate of increase at 74%.

The study estimates that of the total number of rural households 0.79% had an annual income of more than Rs. 20,000.

4) Sale of spurious and substandard fertilisers and fertiliser mixtures:

Instance of manufacture and sale of spurious and substandard fertilisers and fertiliser mixtures in the guise of fish manures and fish mixtures etc., have come to the notice of the Depart- of Agriculture. These products are mostly manufactured and sold in South Kanara district and in other districts by some unscrupulous persons and bogus parties. It is here by brought to the notice of all concerned that while fish manure is in organic form dose not come under the purview of the Fertiliser Control Order, any material mixed with any of the chemical fertilisers will come under the definition of fertiliser mixture and hence under the purview of the Fertiliser Control Order 1957. Such mixing can be done only under a valid certificate of registration (Licence) to be issued by the Deartment of Agriculture and in accordance with the provision of the Fertiliser Control Order. So far, no certificate of registration has been issued by the Department of Agriculture for mixing of fish products with any of the chemical fertilisers.

All persons engaged in manufacture and sale of any fish manures are here by warned that sale of any mixture containing chemical fertilisers pre-pared without licence is an offence under F.C.O. 1957 and liable for punishment with imprisonment and fine. Farmers are also advised not to purchase such spurious mixtures. Before any puchases are made, it is advisable to contact the local officials of the Agriculture Dapartment.

5) Dr. R. Dwarakinath formerly Director of Extension, University of Agricultural Sciences, Hebbal, Bangalore has taken over charge as Director of Agriculture, Government of Karnataka on 5th June 1974 Vice, Dr. H. L. Kulkarny assumed charge as full fledged Vice Chairman, Karnataka Agro Industries Corporation, Bangalore.

VIII DEPARTMENTAL NEWS

a) Director's Tour

The Director of Agriculture was in Bhadravathi on 2–5–74 and attended the field day organised by Madras Fertilisers, where he also inspected Farmers Training Centre and seed farm. He left for New Delhi on 13-5-74 to attend the working group meeting of the National Commission on Agriculture on strategy for agricultural planning in drought and flood prone areas. He left for Chitradurga on 22–5–74 and held discussions with the Deputy Director of Agriculture, with regard to various agricultural development programmes taken up for the year 1974-75. He was in Dharwar on 23–5–74 and held discussions with the Deputy Commissioner with regard to stock position of fertilisers and seeds in the district. He inspected seed farm Soundatti and land development works in Malaprabha project area on 24–5–74. He was in Haveri on 25-5-74 where he held discussions with the Assistant Director of Agriculture, Deputy Director of Agriculture, Dharwar and members of legislature of Dharwar district about the problems encountered in supplying the inputs to the farmers in time.

b) Schemes : Nil.

c) Promotions & transfers :

The following class III officers in the Department of Agriculture were promoted to the class II cadre.

Sl. No.	Name and present Designation	Where posted
1	D.Venkatarayappa, Agricultural Extension Officer, Gowribidanur.	Agricultural Officer (Soil Survey), Almel.
2	N.P.Desai, Asst. Agricultural Officer, Dharwar.	Agricultural Officer (Cotton) Dharwar.
3	M. K. Sathyanarayana Asst. Agril. Officer (STL) Mandya	Separate posting order will be issued.
4	S. C. Basavaraj Asst. Agril. Officer (SCN) Head Office, Bangalore.	Agricultural Officer (Seed Devt.) Bangalore.

5 B. Ananda Asst. Agril. Officer (SC), Mysore.	Agricultural Officer (Central Mobile Unit) Dharwar.
6 V. Seetharama Sharma Head Master, R.K. Shala, Anekal.	Agricultural Officer (Instructor) RDTC. Bagalkot.
7 K. Ramaswamy Asst. Agril. Officer (Plant Protection) Bangalore.	Agricultural Officer (STL) Bijapur.
8 S. Mune Gowda Asst. Agril. Officer, (Undergoing M.Sc. (Agri) course.	Agricultural Officer (STL) Dhadesugur & allowed to continue in higher studies.
9 R. Marikotrappa Manager, Seed Farm, Hospet.	Agricultural Officer (STL) Dhadesugur.
10 B. S. Ganeshkumar Asst. Agril. Officer, (PP) Mercara.	Agricultural Officer (Seed Devlop-ment) Mangalore.
11 Srikantaiah Asst. Agril. Officer (OOD) Mysore Sewage Farm.	Agricultural Officer (GLBC) Dharwar.
12 G. N. Narayanappa Asst. Agril. Officer, Chickballapur	Agricultural Officer (STL) Kolar.
13 S.V.Kamalaksha, Instructor(SCTC for AAO's) Mysore.	Agricultural Officer (Seed Devt) Gulbarga.
14 R.N.Nandini, Manager, Seed Farm, Kallolli.	Agricultural Officer, (PP) Bijapur.
15 Y. Sannatotappa Agril. Extn. Officer, Mallapur.	Agricultural Officer (Information) T.B.P. Raichur.
16 N. K. S. Prasad Asst. Agril. Officer (on higher studies)	Agricultural Officer (SDSC) Chincholi & allowed to continue in higher studies
17 B. Chandrashekarappa Asst. Agril. Officer, Santebennur.	Agricultural Officer (SDSC) Chincholi.
18 V. K. Siddararamaiah Asst. Agril. Officer (on higher studies).	Agricultural Officer (Seed Devt.) Raichur & allowed to continue in higher studies.

19 S. Venkata Raju Asst. Agril. Officer, Mysore.	Agricultural Officer, (Seed Dev). Raichur
20 C. C. Makanur Asst. Agril. Officer, Dharwar.	Agricultural Officer (C.F.W.) R.D.T.C. Dharwar
21 Boregowda Agril, Extn. Officer, Srirangapatna	Agricultural Officer (SDSC) Gulbarga.
22 N. A. Vittal Agril. Extn. Officer, Shimoga.	Agricultural Officer (Manure Dev.) Bijapur
23 Shivalingaiah Asst. Agril. Officer (Compost Dev) Bangalore.	Separate posting order will be issued.
24 K. H. Seetharama Reddy Asst. Agril. Officer, (SC) Chitradurga.	Agricultural Officer (SDSC) Yadgir.
25 D. K. Puttaswamy Instructor, RDTC Mandya.	Agricultural Officer (Instructor) RDTC Dharwar
26 K. R. Seshalachala Rao Asst. Agril. Officer (Sugarcane) Bangalore.	Agricultural Officer (STL) Mangalore.
27 Basavanappa Asst. Agril. Officer (SC) NRVP Gulbarga.	Agricultural Officer (Groundnut Extn.) Haveri.
28 K. Shivaiah Agril. Extn. Officer, K. R. Nagar	Agrilcultural Officer, (SDSC) N.R.V.P. Gulbarga.
29 H. C. Koriayaiah (Repatriated from University of Agril. Science)	Agricultural Officer (SDSC) N.R.V.P. Bidar.
30 B. N. Kavalappa (Repatriated from University of Agril. Sciences).	Agriculture Officer (STL) Gulbarga.
31 M. Narayanappa (Repatriated from University of Agril. Sciences)	Agricultural Officer, (Instructor) RDTC, Gangavathi.

32 M. Sreerangaiah Asst. Agril. Officer (SC) Gubbi.	Agricultural Officer, (Soil Survey) Upper Krishna Project.
33 D. B. Thimme Gowda Asst. Agril. Officer, Mandya.	Agricultural Officer (SDSC) Afzalpur,
34 B. N. Renukaradhya Instructor RDTC, Gangavathi.	Agricultural Officer, (Instructor) RDTC, Gangavathi.

d) Publications, Extension materials & Radio talks :

Fortnightly seasonal tips for the benefit farmers in the State for the month of June were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and Publicity and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore, for broadcast.

Material for the dialy programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio. Bangalore, to be broadcast in the evening programme "Krishi Ranga".

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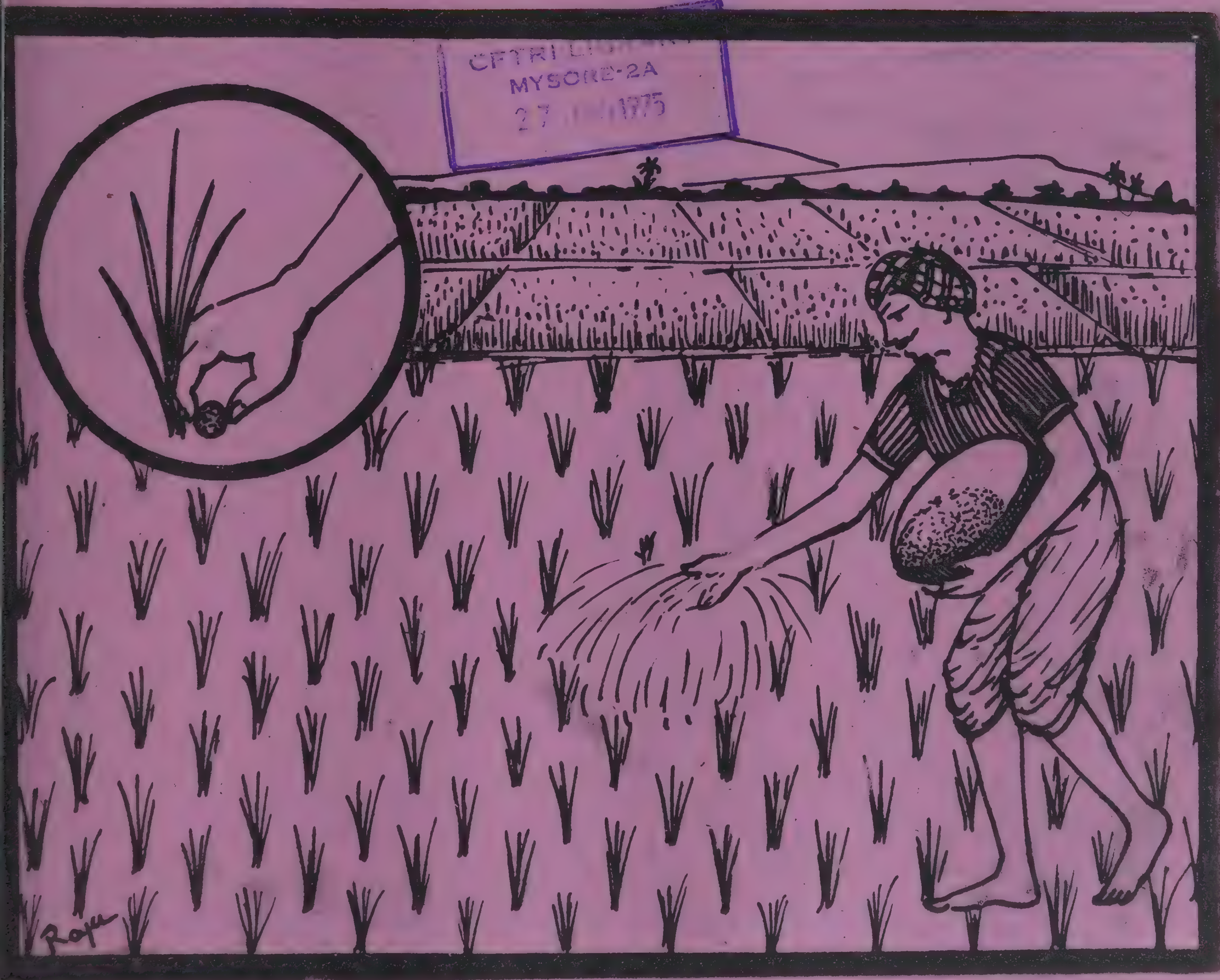

FARM ADVISORY AND EXTENSION SERVICES

DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

Cover :

August is the month for top dressing of paddy. In view of the fertiliser shortage, new methods are being evolved to produce higher yields at lower levels of chemical fertilisers. Curing of urea and applying to root zone of the plant is one of the methods advocated.

During the past month, certain events took place which should be known to all the members of the Department. The first one was the meeting of the State team with the Union Minister for Agriculture to discuss the State agricultural production programmes. The main emphasis in this meeting was utilisation of available resources for stepping up agricultural production inspite of the fact that certain inputs like fertiliser, power and pesticides were in short supply. The State team emphasised the point that in the distribution of available resources, the State's share of fertilizers need to be increased. This point was well taken. The second important event was the Zonal Conference on fertilisers held at Madras. Here again the State team was successful in securing better appreciation of the fertiliser needs of the State. As a result, the allotment for rabi season was stepped up by a substantial amount. The other important event was the meeting of the Prime Minister and the Union Minister for Agriculture with the officers concerned with agricultural production in the State. Emphasis here once again was on making earnest efforts to utilise the available production resources with greater effectiveness. Items like rapid flow of technical knowledge to the farmers, revamping of extension services and harnessing of local production resources were emphasised during the discussion. Some beginning has, of course, been made in the State in the direction of better utilisation of irrigation facilities, rapid development of command areas, efficient utilisation of fertilisers, mobilisation of local manurial resources, extensive use of hybrids and other improved varieties, and extensive application of dry farming practices. But, these are beginnings. A lot more needs to be done in making these aspects of improved agricultural technology available to a large number of our farmers as rapidly as possible. It is here that the Deputy Directors of Agriculture and their co-workers could achieve a significant progress. This is what is required for the kharif season.

Apart from this, there are certain immediate tasks that require our attention in the next few weeks. Briefly, I have listed them below:

1) Distribution of fertiliser cards:

Even as late as 11th July, 1974, when we reviewed the

situation, distribution of cards was only 45%. In some districts, it was as low as 6%. This is not very creditable. Time fixed for distribution of cards is well-known. No doubt, there are field problems. Wherever the problem is of availability of Village Accountants, the concerned agricultural authorities should bring in the revenue officers into the picture in order to secure the services of Village Accountants or to find suitable alternative methods. The farmers from some areas are already voicing their displeasure at the slow distribution of cards. In any case, permits have been discouraged. Cards should be distributed to the farmers without any further delay. Slowness in this regard will be ultimately traced to inaction of individuals which could be avoided by prompt action at present.

2 Meeting the weather problems :

In some areas, early monsoon has been disappointing. Where early sowings have been done, on account of lack of later rains, the crops have dried up. There resowing is needed. In other areas where regular kharif sowing have been delayed, alternative crops or varieties have to be thought of. In regions where ragi fits in, short duration ragi like Poorna could be suggested. In areas where paddy crop has been delayed, Madhu paddy may be suggested as a short duration variety, provided the variety has proved satisfactory in the earlier trials. In areas where rainfall is adequate, maize could be a profitable crop to suggest, if it had been tried earlier. Seeds of these three crops are available in the State. Agricultural Officers should take a close look at their respective agricultural conditions and should recommend to the farmers not only alternative agricultural practices, but should also obtain the requisite seed material in time to enable the farmers to adopt these recommendations.

3) Assessing plant protection needs :

All of us should realise this year that there is a dearth of plant pretection chemicals. This means that not only should we redouble our efforts to obtain whatever quantities of chemicals are available in the market, but should also use the available chemicals with utmost discretion. The district staff in this connection should carefully review the past plant protection problems in each district and build up projections to the extent possible of the likely plant protection

problems this year. Based on this, lists of chemicals including alternatives should be worked out. Some portion of these chemicals, say 25% to start with, should be obtained and stocked in the districts. Simultaneously, educational efforts should also be initiated both for the field extension staff and the progressive farmers in identifying pests and or diseases in the initial stages so that the problem may be tackled effectively as soon as it occurs. This action is specially requested of the Deputy Directors of Agriculture and their specialist staff.

4) Efficient use of fertilizers :

An earnest effort was made at the beginning of the kharif season to provide an opportunity to the Deputy Directors of Agriculture to have discussions on efficient use of fertilisers. It is expected that all of them are making earnest efforts in not only building up experience in this regard, but also encouraging farmers to adopt measures that would result in more efficient utilisation of fertilisers. Soil test related fertiliser application, foliar sprays, split dose of application, curing of urea in the case of paddy are some of the prominent methods that they can build up. The extent to which this has been practiced in each district will come up for review at the district, divisional and State level during this season.

5) Timely weed control :

The problem of weeds has assumed a special significance in the context of fertiliser shortage, and scarcity of irrigation water and rainfall. It is well recognised that weeds rob economic crops of their nutrients and moisture. But unfortunately we have not systematically compaigned to impress the farmers of the gravity of the matter. Whatever weed control methods are adopted-manual, mechanical or chemical–we should see that at least in the case of food crops and commercial crops, weed control is taken by the farmers in time and repeatedly so that weeds do not compete with the main crops.

The above points are only some items that need our immediate attention. There are of course many others. I would very much appreciate if all that we advocate are effectively adopted on our seed farms. The Joint Directors of Agriculture and Deputy Directors of Agriculture are requested to make it a point to see that this is done.

Lastly, the delegates convention of the Farmers' Forum went off very well. A large number of delegates (estimated at 4000) attended the function. I appreciate the Deputy Directors of Agriculture and their colleagues who have put in their share of efforts to make this function a success.

R. Dwarakinath
Director of Agriculture

II The month in retrospect

(Seasonal and crop conditions during June, 1974)

Fairly good rains were received in northern districts of the State like Bidar, Bijapur, Belaum, Bellary and Gulbarga which facilitated sowing of kharif crops. The situation in southern districts of the State like Bangalore, Mysore, Hassan, Chickmagalur and Coorg was gloomy. Due to continuous dry spell, sowing of kharif crops were held up. In many districts standing kharif crops were withering for want of moisture in the soil. Preparatory tillage operations for raising paddy nurseries and sowing of hybrid maize, sunflower, ragi, groundnut and pulse crops, etc. was going on. The agricultural situation in brief for each division is given below :

Bangalore division :

Dry spell prevailed in Bangalore, Kolar and in parts of Chitradurga and Tumkur districts. Scattered showers were received in Shimoga. The weather was mainly cloudy and chilly. Important agricultural operations carried out were sowing of hybrid maize, hybrid jowar, hybrid bajra, transplanting of ragi, sea island cotton, harvesting of summer crops like paddy, groundnut, ragi and hybrid jowar. There were no reports of incidence of pests and diseases.

Mysore division :

Excepting a few passing showers, dry spell prevailed in the districts of Mysore, Mandya, Coorg, Hassan, Chickmagalur and South Kanara. Dry and cloudy weather prevailed on most of the days. The standing kharif crops like hybrid jowar, hybrid maize, ragi, groundnut, etc. had started withering in Mysore, Mandya, Coorg, Hassan and Chickmagalur districts. In many districts kharif sowing were held up for want of moisture in the soil. The potato crop in Chickmagalur and Hassan districts was severely affected due to continuous dry spell. Excepting mealy bug on paddy nurseries in South Kanara district, there were no reports of incidence of major pests and diseases.

Belgaum division :

Fairly good showers were received in the districts of Belgaum, Dharwar Bijapur and North Kanara. Cloudy and cool weather prevailed. Major agricultural operations carried out were sowing of hybrid jowar, hybrid maize, groundnut and pulses, preparatory tillage operations for raising paddy nurseries, incorporation of green manure crops to the paddy plots,harvesting of summer crops. There were no reports of incidence of major pests and diseases.

Gulbarga division :

Good rains were received in

Gulbarga, Bellary, Bidar and Raichur districts. Cloudy weather with intermittent showers prevailed. Sowing of hybrid jowar, groundnut, ragi, navane, hybrid maize and hybrid bajra, weeding, top dressing and earthing up of Sugarcane were some of the major agricultural operations carried out. Excepting flea-beetle and grass hopper on hybrid jowar, there were no reports of incidence of major pests and diseases.

III INPUTS FOR FARMERS :

a) Fertilisers :

The Zonal Conference for the allo ment of fertilisers to various Southern States was held at Madras on 25th and 26th June 1974. This meeting was convened by the Government of India and was attended by the officials of the State Government and representatives of the Domestic Manufacturers. The Government of India taking into consideration the production programme that will be implemented in Karnataka have allotted 94,250 tons. of Nitrogen, 51,163 tons of Phosphorus and 34,036 tons of Potash for the ensuing rabi season. This represents an increase of nearly 30% over the allotment for corresponding period during 73–74.

On the basis of this allotment the State Level Meeting was held with the Domestic Manufacturers under the Chairmanship of Development Commissioner on 18-7-74 to finalise the districtwise allotments. Government order in this connection are expected to be issued shortly.

As a result of the various efforts made by the State Government with the Centre, fertilizer Corporation of India, Railways and Domestic Manufacturers, it has been possible for the State to get supplies of fertilisers to the various destinations in the State as per allocation. The major constraint in the supplies was the transport bottleneck. This issue was taken up with the Railways who had provided the necessary wagon facilities from the factory sites of Domestic manufacturers while Government of India on representation by the State Government permitted the road movement upto 1,000 km in respect of the pool fertilizers. This has enabled the State Government to obtain the stocks in sufficient quantities. The stock position in the State at present is fairly satisfactory and there is a stock of 81,000 tons of differnt types of fertilizers.

I Economics of wheat (U. P. 301) cultivation

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Wheat is the staff of life of millions all over the world and India too. The crop is grown on area of about 19 million hectares producing nearly 30.76 million tonnes of grain. About 87% of the area lies in North and Central India. Wheat occupies about 12% of the total area under cereals and 76% of that under winter cereals. In Karnataka State, wheat is an important rabi food crop in northern parts of the State. During 1972-73 the extent of coverage under wheat crop in Karnataka State was about 3,46,489 hectares. In the recent years a few varieties of wheat like Lerma Rojo, Safed Lerma, Choti Lerma, U. P. 301, Pusa Hira, have been developed and are released for commercial production. These are found to be well suited to the wheat growing regions of the state, both under irrigated and dry conditions. They are not only high yielding varieties, short duration, but also tolerant to certain types of rust diseases to which the local varieties are suscetible. U.P. 301 is one of the important varieties of wheat gaining much importance in the state of late. In this paper the economics of U. P. 301 variety of wheat has been analysed and presented.

The Sample :

Data was collected from the Pocket books of National Demonstration plots laid out by the Department of Agriculture of the State. The data analysed was pertaining to the 10 National Demonstration plots laid out under irrigated condition during rabi season (1972-73) in different districts. of the Karnataka State. The details regarding the name of the demonstrator, village, taluk and district are given in appendix-I.

Cost return relationship :

In the present study, only the variable costs of cultivation such as costs incurred on seeds, manure, fertilisers, plant protection chemicals, human and bullock labour and irrigation charges are considered.

The fixed costs like rent and rental value, depreciation charges, land revenue and the interest on investment are not included since the data on these items were not available.

Table-I presents the costs incurred on different items of production. The total costs of cultivation per acre was Rs. 618.78. On an average Rs. 96.69 or 15.63% of the total variable costs was spent on seeds and Rs. 47.81 or 7.73% of the total cost was incurred on farm yard manure. The cultivators incurred an amount of Rs. 289.78 or 46.32% of the total variable costs on fertilizers alone. It is also observed from the table that the amount spent on plant protection chemicals was very meagre and it was only Rs. 19.71 or 3.19% of the total cost. The cultivators on an average spent an amount of Rs. 138.35 or nearly 22.36% of the total cost on labour (human and bullock labour). The remaining amount of Rs. 26.44 or 4.27% of the total cost was towards irrigation charges.

Thus, it could be concluded from the above discussion that the cost of fertilizers followed by labour charges and costs of seeds were the major items of expenditure. These three variable inputs together accounted for 84.81 per cent of the total variable cost of cultivation.

TABLE-I

Cost of cultivation of wheat (U. P. 301) in Karnataka State during the year 1972-73

Sl. No.	Items	No. of cases	Total area in acres	Costs incurred for the whole area	Costs per acre	Percentage to total area
1	Seed	10	16.00	1,547.00	96.69	15.63
2	Manure	10	16.00	765.00	47.81	7.73
3	Fertilisers	10	16.00	4,636.50	289.78	46.82
4	Plant protection chemicals	10	16.00	315.50	19.71	3.19
5	Labour charges (human and bullock)	10	16.00	2,213.50	138.35	22.36
6	Irrigation charges	10	16.00	423.00	26.44	4.27
7	Total cost of cultivation (Variable costs)	10	16.00	9,900.50	618.78	100.00

Yield, gross and net income :

It could be seen from the data of table II that the average yield of grain and straw obtained per acre was 1,465 kgs and 2,279 kgs respectively. The average value realised from the grain and straw was Rs.1,924.06 and Rs.206.47 respectively. On an average an amount of Rs.2,130.53, was realised as gross income and Rs. 1,511.75 as net income from cultivating an acre of U.P.301 wheat crop.

TABLE–II

Average yield, gross income and net income obtained per acre in the cultivation of wheat(U.P.301)

Sl. No.	Items		Quantity	Amount Rs. P.
1.	Yield (kgs)			
	a. Grain	....	1,465	1,924.06
	b. straw	....	2,270	206.47
2.	Gross income	....	—	2,130.53
3.	Total variable costs	....	—	
4.	Net income	....	—	1,511.75

APPENDIX-I

Sl. No.	Name of the Demonstrator	Village	Taluk	District
	Sriyuths :			
1	Shankar Gowda	Bylahi	Hubli	Dharwar
2	Mushappa	Bhadrapur	Navalgund	Dharwar
3	Mahadevara Kale	Nelvagal	Ron	Dharwar
4	Abdul Khaliq	Chikkabyadagere	Belur	Hassan
5	Shambu Gowdar, T.	Desihalli	Maddur	Mandya
6	Shama Rao	Hanjagondanahalli	Arasikere	Hassan
7	Narasimhaiah, K. N.	Kyathanahalli	Pandavapura	Mandya
8	Parvathappa, T.	Devigere	Hosadurg	Chitradurga
9	Revanappa	Singere	Chitradurga	Chitradurga
10	N. Rayappa	Dharmasagar	Hosapet	Bellary

2) Multiple cropping with hybrid cotton in Sindhanur Taluk

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Introduction :

It is the trend of every cultivator to grow a crop which gives more monetary benefits. In a tract like Sindhanur which is having 90% of the area under Black cotton soil, prior to the introduction of T.B.P. water for irrigation, cultivators used to grow traditional crops of jowar and cotton. The yields of these crops were very poor on account of the eratic monsoons and low levels of fertility. Such traditional cultivation has to cease with new aids that have come in recents. The different crops yield more with better profits. Tha evolution of Hybrids and High yielding varieties has opened new chapter for irrigated Agriculture. If it is desired to increase the per acre income, intensive agriculture has to be followed. For intensive agriculture, better technology of agriculture to harness the resourcess of the farmer is required. The new legislation of land improvement act limiting the the size of holdings etc. has awakened the cultivators to put the land for better utility by exploiting the available resources. It is here that the knowledge of multiple cropping plays an important role in accelerating farm income without any detrimental effect on the soil.

Necessity of multiple cropping with hybrid cotton :

Giving protective irrigation to the traditional crop of jowar and to indegeneous cotton could not satisfy the cultivators as the yields were low. Under the changed conditions the cultivator started growing paddy after paddy as it was the only crop to fetch high average yields and more profits. The soils of Sindhanur taluks were not localised for paddy cultivation in the greater proportion of the area. There was a conflict of ideas on the one hand from the cultivators to grow paddy continuously in the newly developed land for better profits tentatively. On the other hand the advice of the Government to grow light irrigated crops in the black cotton soil areas which require less water with least detrimental effect on the soil and as the development of irrigation takes place, the available water from the source can be benefitted by large number of consumer

cultivators. The cultivators were eagerly waiting for a crop which gives them higher returns with less no. irrigations having no detrimental effect on the soil. The evolution of high yielding hybrid American cottons with improved quality of cotton has paved way as it gives high cost benefit ratio and requires less water as compared to paddy. At present the hybrids like Hy-4 cotton, Varalaxmi have become very popular with an average yield of 8-10 quintals/acre having more than 1" of staple length and better quality cotton and with a cost benefit ratio of nearly 3.7 which exceeds all other crops when grown singly. The Hybrid cottons occupy the land for about 210 days and require not more than 500-700 mm of water and are idealy suited to the land covered with jowar and indegenous cotton previously. Our country is in dire need of this type of high quality cotton and it is likely that this cotton will be extended to larger area during the coming years to meet the ever increasing demands of the country.

If cotton is to be grown alone the land use will be limited to the period of about 210 days occupied by the cotton crop. Cotton crop forms only a money crop. Food and fodder is required to be produced by each cultivator. Hence in order to put the land to maximum use and to produce food and fodder it is necessary to adopt multiple cropping with cotton as suggested below. Growing onion along with cotton does not interfere with the normal yields of cotton as the cotton crop makes slow growth in the initial stages and does not interfere with fertility as the hybrid cotton is spaced 10 sq. foot per plant. After the harvest of cotton crop, raising crops like hybrid jowar or paddy is highly beneficial as it helps to produce food and fodder in addition to the normal returns of each crop. Growing navane and Kharif Bajra with cotton helps production of food but the yields of cotton are reduced to certain extent as the sowing dates of cotton are post poned. It may be noted that multiple cropping with cotton not only helps to

Results of Demonstrations and their economics :

	Yields of Sequence Qt.	Kg.	Cost benefit ratio-per rupee spent	Employment opportunity Men	Bullock
Hybrid cotton (Average per acre yield)	12	00	3.7	42	12
Onion - H4 cotton	27	62	4.6	112	28
Chillies - H4 cotton	13	70	3.2	167	12
Navane - H4 cotton	16	00	3.3	92	28
Navane - Varalaxmi	16	00	3.7		
H4 Cotton - H.jowar	22	00	4.2	85	30
H4 Cotton - Paddy	36	00	5.0	114	38

produce more food but also increases the employment opportunities as can be seen in the table above. For details of results of demonstrations please see annexure no 1&2.

Extension and benefits of these sequences:

The demonstration of multiple cropping with cotton are shown in annexure no. 1 & 2. Inputs for the 1 st crop was supplied free of charge during the year 1973–74 to the cultivators. Timely operations are necessary to get normal yields. The commercial banks and other nationalised banks are extending crop loans to the cultivators taking up cotton crop to undertake all cultural operations and plant protection measures as per scales of finance approved by the Department. It is advisablc to make available the inputs required to get the maximum returns from each acre in a consolidated block in Sindhanur taluka so that regular marketing of the produce can be arranged. This may pave way for agriculturists to adopt better cropping patterns for more profit, for food and fodder and to supply required quantity of quality cotton to the textile mills.

ANNEXURE–I

Results of extension demonstrations conducted during the year 1973–74 in

Sl. No.	Name of the farmer	Location	I crop	Yield in Qtl.	II crop
1	2	3	4	5	6
1	Amarappa	Virupapur	Onion	8-00	H-4 cotton
2	Amaregouda	Chikkadabur	,,	30-00	,,
3	Basanna/Lingappa	Ramathnal camp.	,,	25-00	,,
4	Venkatarathnam	Pagadinni	,,	4-50	,,
	Average		,,	16-87	,,
1	Amaregouda	7th mile	Chillies	0-50	H-4 cotton
2	Sanna Bhimappa	Hullur	,,	4-50	,,
3	Siddaramappa	Yapalparvi	,,	6-50	,,
4	Trygnanayya	Huda	,,	1-00	,,
5	Khajahussin	Sindhnur	,,	10-00	,,
	Average		,,	4-90	,,
1	Sangappa/Basappa	Gunjalli	Navane	7-00	Varalaxmi
2	Vatakallppa	Turvihal	,,	8-00	H-4 cotton
3	Amaregouda/Malakendrappa	Chikkadabur	,,	8-00	,,
4	Narasangouda	Kannari	,,	8-00	,,
5	Pampanna	Bommanal	,,	1-50	,,
	Average		,,	6-50	,,
1	P. Sathyanarayanaraju	K. Hosalli	H-4 cotton	9-50	Paddy
2	B. Hanumanthappa	Hanchinal camp.	,,	1 0-00	not sown
3	Kisan Rao	Walkamdinni	,,	11-00	,,
	Average		,,	10-10	,,
1	Vithal Singh	Gonal	H-4 cotton	11-00	Pillipesaru
2	Sathyanarayana	Pagadinni	,,	12-00	Udid
1	Rajasab	Gunjalli	,,	8-00	H. Jowar
2	Chennangoud	Ragalparvi	,,	15-00	,,
3	Lenkappa	Singapur	,,	8-00	,,
	Average		,,	10-30	,,
1	Sriramulu	Geetha camp.		12-00	Pillipesaru
1	Fakirappa/Nagojappa	Udbal	,,	7-00	Sunhemp

Out of the above several Multiple cropping sequence the sequence with onion+Hybrid cotton has given the high As regards tonnage of Agricultural output, the sequence w sequence has given the highest yield in quintals.

ANNEXURE-2

Statement showing the date of sowing and harvest of crops included in sequences with cotton crop during 1973-74

Sl. No.	Name of the farmer & Village	sequence	Crop	Date of sowing	Date of harvest	Total no. of days
1	Amarappa Virupapur	I	Onion	26.6.73	25.10.73	123
		II	H4 cotton	15.8.73	11. 2.74	180
2	Amaregouda Chikkadabur	I	Onion	4.6.73	29. 9.73	118
		II	H4 cotton	16.8.73	15. 2.74	184
3	Basanna/Lingappa Ramathnal	I	Onion	3.7.73	15.11.73	136
		II	H4 cotton	20.8.73	15. 3.74	208
4	Venkatratnam Pagaddinni camp	I	Onion	21.6.73	30. 9.73	72
		II	H4 cotton	10.8.73	7. 2.74	182
5	Amaregouda 7th mile camp	I	Chillies	25.7.73	20.10.73	88
		II	H4 cotton	15.8.73	12. 2.74	181
6	Sannabhimappa Hulkur	I	Chillies	25.6.73	2.10.73	100
		II	H4 cotton	10.8.73	6. 2.74	180
7	Siddaramappa Yapalparvi	I	Chillies	10.7.73	5.12.73	139
		II	H4 cotton	20.7.73	2. 2.74	198
8	Trignanaiah Huda	I	Chillies	20.8.73	25. 1.74	158
		II	H4 cotton	25.7.73	25. 2.74	215
9	Khajahussain Sindhanur	I	Chillies	15.7.73	15.11.73	123
		II	H4 cotton	15.7.73	12. 2.74	181
10	Sangappa Basappa Gunjalli	I	Navane	4.5.73	2. 9.73	121
		II	Varalaxmi cotton	10.9.73	8. 3.74	180
11	Vatakallappa Turvihal	I	Navane	15.5.73	15. 8.73	92
		II	H4 cotton	15.9.73	14. 3.74	181
12	Amaregouda Chikkadabur	I	Navane	7.5.73	6. 8.73	92
		II	H4 cotton	15.8.73	20. 2.74	189
		III	Pillipesaru	2.3.74	15. 4.74	45
13	Narsangouda Kannari	I	Navane	15.5.73	6. 9.73	114
		II	H4 cotton	10.9.73	15. 3.74	187
14	Pompana Bommanal	I	Navane	16.7.73	20.10.73	97
		II	H4 cotton	26.8.73	30. 3.74	217
		III	Pillipesaru	6.4.74	20. 5.74	45
15	P. Satyanarayana Raju K. Hosalli camp	I	H4 cotton	20.7.73	26. 1.74	191
		II	Paddy	10.1.74	5. 5.74	115
16	Vithal Sing Gonal	I	H4 cotton	25.8.73	26. 2.74	186
		II	Pillipesaru	3.3.74	20. 4.74	49
17	Sathyanarayan Pagadinni camp	I	H4 cotton	10.7.73	7. 2.74	213
		II	Udid	5.4.74	31. 5.74	57
18	B. Hanumanthrao Hanchinal camp	I	H4 cotton	25.7.73	28. 2.74	219
		II	Paddy	not sown		
19	Kishan Rao Walkamdinni	I	H4 cotton	8.7.73	30.12.73	176
		II	Paddy	10.2.74	5. 7.74	146
20	Rajasab Gunjalli	I	H4 cotton	15.8.73	11. 2.74	180
		II	H Jowar	1.4.73	10. 7.73	101
21	Sriramulu Geetha camp	I	H4 cotton	15.7.73	13. 2.74	182
		II	Pillipesaru	10.3.74	20. 4.74	42
22	Fakirappa/Nagojappa Udbal	I	H4 cotton	17.8.73	26. 2.74	194
		II	Sunnhemp	10.3.74	30. 4.74	52
23	Chennangouda Ragalparvi	I	H4 cotton	27.7.73	4. 2.74	193
		II	H. Jowar	6.2.74	16. 5.74	100
24	Lankeppa Singapur	I	H4 cotton	15.7.73	15. 1.74	184
		II	H. Jowar	20.1.74	9. 5.74	110

I) High yielding rice varieties and the areas of their adaptability.

Introduction:

The I.C.A.R. has recently brought out a booklet under the above title, listing out varieties under "Released", "Pre-release" and "Minikit" Programmes. The varieties under the "Pre-release" and the "Minikit" programmes are listed below:

Pre-release varieties:

'IET 849'. It is an early maturing short statured variety (108 days) with a good tillering capacity and has medium slender grains. 'IET 849' is a derivative from a cross 'TN 1' x 'Co 29'. This variety has a slow leaf senescence.

Rice is white with abdominal white. Cooking quality is acceptable.

'Pusa 2–21' (IET 1983). Pusa 2-21 is one of the varieties having high yield potential in the early group (112 days). This variety has a highly synchronous tillering habit and a slow leaf senescence. Other desirable characteristics include a good tillering habit, early seedling vigour and well exserted panicles.

Being a derivative from a cross between 'IR-8' and 'Tkm 6', this variety shows moderate resistance to stem borer at the dead heart (tillering) stage.

Abdominal white is present in the kernels which are white. 'Pusa 2–21' has a good cooking quality. Its protein content is 8.9%.

'Pusa 2-21' has since been released as 'Kannagi' in Tamil Nadu.

'CR 44-35' (IET 1410). This strain is a sister selection of 'Ratna' having been derived from a cross 'Tkm 6' x 'IR-8'. Its yield potential has been reported to be greater than 'Ratna'. On account of its earliness in northern India, especially in Uttar Pradesh, and a good yield potential 'CR 44-35' has been released for large scale cultivation in Uttar Pradesh under the name 'Saket-4'. The maturity period of the variety in U. P. is 105 days and 117 days at Cuttack.

Grains of 'CR 44-35' are long, slender and without abdominal white. Head rice recovery is moderate.

'CR 44-35' shows moderate tolerance to stem borer.

'CR 44-1'. It (IET 1422) is another early (118 days), short statured sister

selection of 'Ratna' having long and slender grains. The translucent white kernels have no abdominal white. Cooking quality is good.

'CR 36-148' (IET 1530). A medium early maturing variety (125 days) with medium slender grains, CR 36-148 has been derived from a cross IR-8 x (GEB 24 x TN 1). It is slightly later than Padma but has higher yield potential than the latter. The short plants with erect leaves have a high response to nitrogen. Rice is white.

It shows moderate tolerance to stem-borer.

The variety has since been released as Supriya in Orissa on account of its suitability for 'beali' (rainfed upland conditions) and rabi seasons.

'CR 10-4103' (IET 1039). IET 1039, a derivative from the T 90 x IR 8 combination, is medium maturing (135 days) with long and slender grains. Its yield potential is on par with Jaya. Plants are short statured with a good tillering ability and an early seedling vigour. The panicles are long with a high number of grains.

'IET 1039' shows resistance to several races of blast. It possesses a moderate tolerance to stem borer.

Rice is white, translucent without abdominal white. It has a good head rice recovery. Cooking quality is acceptable.

The variety has since been released as 'Jayanti' and recommended for areas where 'IR-8' and 'Jaya' are currently grown. It is especially suitable for the moderate low lands of West Bengal, Bihar and Orissa.

'CR 10-114' (IET 1537). It is another sister selection of 'Vijaya' but with long slender grain and matures in 131 days. The translucent white kernels (without abdominal white) have an attractive appearance and can be used as a 'pulao' rice. Cooking quality is very good.

This variety exhibits some degree of tolerance to stem-borer.

'CR 10-5071' (IET 1391). A medium maturing variety (135 days), 'CR 10-5071' has medium slender grains. It has a good plant type, an early seedling vigour and a good tillering ability. Its yield potential is as good as that of 'Jaya'. The cooking quality of 'CR 10-5071' is good.

Tolerance to stem-borer is moderate.

'IR 22'. IR 22 (formerly known as IR 579-160-2) is an introduction from the International Rice Research Institute, The Philippines, and has been derived from the cross 'IR-8' x 'Tadukan'. Plants are short statured with erect leaves. Seedling vigour is good and tillering capacity is moderate. Compared to 'IR-8' this variety is slightly more sensitive to day length. It matures in 135 days.

Grains are long and slender. Kernels are translucent without abdominal white. Its head rice recovery is good. Amylose content is also high.

Kernels are dry and fluffy after cooking.

'IET 1136'. This is a medium duration (144 days) selection made at Hyderabad from the material 'IR 644' (IR 8/2 x B.589 A-4-18/2 x T. N. 1) obtained from the International Rice Research Institute. The Philippines. Plants are short statured and medium in maturity.

Grains are long and bold. Kernels are white with abdominal white. Cooking quality is acceptable.

'RP 5-3' (IET 1991). A selection from cross 'GEB 24' x 'T. N. 1' combining excellent, superfine grain with high yield potential and duration comparable to 'Jaya'. It is one of the heaviest yielding slender grained varieties and has a good tillering habit and compact plant type; suited for all area presently growing 'Jaya' or 'IR-8'.

The variety has since been released as 'Sona' on account of its wide adaptability and good grain quality.

'Improved Sabarmati'. An improved reselection from 'Sabarmati' with better tillering and higher yield potential. The rice has the fragrance of 'Basmati' and has good cooking quality. Duration is 135 days.

'OR 10-26' (Orissa). A selection from the cross 'T 90' x IR 8'; it matures in about 140 days in kharif and 125 days in rabi; possesses very good plant type with high-tillering ability and panicles having large number of grains; kernels translucent white, superfine with very good cooking and eating qualities; resistance to bacterial leaf blight and green leaf hoppers.

The highest yield so far recorded in multi-location yield tests was 9,765 kg/ha against 'Ratna' giving 8,441 kg/ha in rabi 1971 at Chiplima and Sambalpur. The results of the Minikit trials are awaited to consider the release of the selection; it is different from 'OR 10-22' in having longer and slightly thicker kernel.

'OR 34-16' (Orissa). A selection from the cross 'T.N. 1' x 'Tkm 6'; matures in 90 days in kharif and 105 days in rabi; possesses good plant type with moderate and synchronous tillering; kernel translucent white, fine with good cooking quality; highly resistant to bacterial leaf blight, bacterial streak and green leaf hoppers.

Highest yield so far recorded in multi-location yield tests was 8,770 kg/ha against 'Bala' giving 8,205 kg per hectare in rabi 1972 at Chiplima and Sambalpur. The results of the district level trials are awaited to consider the release of this very early selection.

Varieties in Minikit programme:

Under the rice improvement, projects, breeders have been identifying new high-yielding varieties which may prove to be even better than some of the varieties described earlier. To

ensure that only the best variety is selected for mass popularization, a rapid and rational evaluation of a new variety in relation to a specific region is necessary. This is being attempted through the minikit programme which makes available to a large number of farmers simultaneously but in small quantities seeds of a few pre-release varieties. These farmers grow the new varieties and the their reaction are assessed for a final evoluation of the varieties by rice researchers as well as extension workers. The new varieties, which have been included in the minikit programme for kharif 1973 season, but which have been listed in the preceding chapters, are given below:

'IET 2913' (RP 79-13) 'IET 2914' (RP 79-14) 'IET 2923' (RP 79-23)	Very early-maturing varieties/(85-95 days under direct seeding), 'IET 2913' being earliest.
'IET 2662' (C. 12329)	Early variety bred in Andhra Pradesh. It has long slender grains, like 'Tella Hamsa'.
'IET 1996' (RP 4-2)	Medium duration (a few days earlier than Jaya); good yield potential, resistance to blast.
'IET 2236'	Early, red-grained variety for Kerala.
'IET 2254' (RP 4-14)	Medium early variety (7-10 days earlier than Jaya) with good potential; long slender grains; moderately resistant to bacterial leaf blight.
'IET 2295' (CR 12-178)	Medium early variety, a week earlier than Jaya; long slender grains; good yield potential.
'IET 1789' (RP 31-49-2)	Two weeks later than Jaya; long, bold grains; resistance to leaf blight, helminthosporiose and leaf and neck blast.
'IET 2113' (RP 5-32)	Long-duration variety (about 145 days); short bold grains; thick culm; resistant to bacterial leaf blight.
'IET 2861' (RP 193-1)	Long-duration variety (about 150 days); long slender grains with clear kernel texture.

Karnataka State:

In the booklet separate portions are devoted to the different States of India with regard to 'predominant' and 'recommended varieties'. The portion relating to Karnataka is given below:

Area-1.2 million hectares. Production–2.1 million tonnes. Coverage under high-yielding varieties–20%.

Rice occupies major area in the State and is cultivated on a variety of soils. Only 40% of the acreage under rice has assured water supply.

Broadly there are two seasons for

rice cultivation except coastal tract where there are three seasons. The main or monsoon (kharif) season is from June to December and the second is kar (summer) from January to May or June. The area under kar is restricted to canal and tank irrigated tracts with exceptions under lift irrigation separately grown throughout the State. In coastal tract the first crop is from June to September, second crop from October to January and the third crop from February to May.

The State is divided into six agro-climatic zones.

Zone I :

Canal irrigated tract. This comprises Mysore, Mandya and Hassan districts. The irrigation is by canals from the Cauvery river, Krishnaraja Sagar and Hemavathi dam.

The soils range from sandy loam to clayey type. Generally varieties of 5 to 5½ months maturity period are grown in main season. Only fine grained varieties are grown. Wherever irrigation facilities exist, a summer crop of 4-5 months duration is cultivated from February to June.

Predominant varieties	**Varieties recommended :**
i) Main season S-701, S-1092, S-749, J-192, (June to August plantings).	Jaya, IR-8, IET-1991, IET-2295 in planting up to 15th July. IR-20 in plantings upto July and Madhu in plantings up to August end.
CH-2 and S-317 (August to September plantings).	No high yielding varieties for September planting (MR-272 is under trials).
(ii) Summer season CH-2, S-317, S-705.	IR-20, Jaya, IET-1991, IET-2295, if water is ample. Madhu if water is limited.

Zone II

Tank-fed part (Bangalore, Kolar, Tumkur). Irrigation is through tank only. Two crops are grown here also as in Zone I. But filling up of tanks depends on receipt of rains which is erratic most of the time leading to delayed planting,

Predominant Varieties	**Varieties Recommended**
Main crop Bangaratheega, Delhi Bhoga, S-705, CH-2, S-317, Dodda Byra, Gidda Byra, S-199.	IR-20, IET-1991, IET-2295, Jaya, in plantings up to 15th July. Madhu up to August end planting. No high-yielding varieties for September planting. (MR-272 is under trial).

Predominant varieties	Varieties recommended
Summer crop S-705, CH-2, S-317	Madhu if water is limited. IR-20, IET-1991, Jaya, if water is not limited.

Zone III

Heavy rainfall hills (Coorg, Chikmagalur and parts of Hassan and Shimoga).

Rainfall ranges from 1,200 to 3,870 mm. Rice is grown in terraced valleys. Blast is endemic. The cropping pattern is same as for Zone I. All varieties take 15-25 days more here for maturity.

Predominant varieties	*Varieties recommended*
KB-356, MR-319, BKB, C-435, CH-45, S-1092, S-317, S-749.	Pankaj: To replace all except CH-45, and KB-356, Madhu: To replace CH-45.
Summer CH-45, S-705.	Madhu and IR-20.

Zone IV

Coastal tract (South Kanara and North Kanara). This is one of the major rice growing tracts. The soil here is lateritic. Three crops are taken and the cropping pattern is similar to that of Kerala. Generally early bold grained red kernelled varieties are preferred. First and second crops are rainfed and third crop is by irrigation.

Predominant varieties	*Varieties Recommended*
I Crop Ptb-10, MGL-1, MGL-2, Ptb-9, SM-79, Mtu-3, Mothalga, T-14-1, M-14-1, M-81.	MR-118, Annapurna, Jaya, (Uplands).
II crop Ptb-20, MGL-5, MGL-7.	MR-118, Madhu, Triveni.
III crop CO-29.	MR-118, Madhu, Triveni.

Zone V

Drilled tract; (Dharwar, Belgaum, and parts of Shimoga and North Kanara). This is rainfed with three situations of land-uplands, mid lands and low lands. Short duration varieties are grown in uplands, mid-late varieties in mid-land and late varieties in low lands. Mixed red and black soils prevail in this zone. Summer cultivation is by lift irrigation or tank fed.

Predominant varieties		*Recommended varieties*
Uplands:	Waner–1, D–6–2–2.	Madhu.
Midlands:	A–200, A–67, M–161, S–26B.	Jaya.
Lowlands:	T–141, Y–4.	Pankaj.

Zone VI

Black soil tract: (Raichur, Bellary, Bijapur and Chitradurga districts and parts of Shimoga). This part is irrigated by Tungabhadra Project. The soils are black cotton type. Kharif and limited summer crops are grown. Considerable area is affected by salinity and alkalinity.

Predominant varieties	*Varieties recommended*
Kharif	
GEB–24, S–1092, HR–35, HR-18, SR-26 B.	Jaya, IR–20, IET-1991, IET–2295, Madhu.
Summer	
CH-2, CO-29, S-705.	Madhu.

(Source: Extracts from "High yielding Rice–varieties and areas of their Adaptability", Published by I.C.A.R., New Delhi.

VI Research News

1 Dipping of rice seedlings in 2% Zinc oxide solution increases yield:

The metabolic processes in plants are controlled by enzyme systems and the normal growth depends upon the proper co-ordination of the latter. Since micro-nutrients are largely associated with the enzyme system, their deficiency would bring about a disturbance in the activity of the enzymes and this in turn would affect the plant growth adversely. In this paper, effect of dipping rice seedlings in oxides of zinc, iron and manganese before transplanting on the subsequent growth and yield are discussed.

One month old seedlings of uniform size and growth of two rice varieties, IR-8 and Sona (IET 1991) were dipped upto rootzone in 1, 2 and 4% solutions of zinc oxide, ferric oxide and manganese dioxide for 2 minutes before transplanting. Before dipping, seedlings of uniform size and growth were selected, and washed with water to remove the mud. Twenty seedlings from each of the treatment were planted in 10 hills in cement cisterns of size of 1.0 x 0.6 m dimeter having a spacing of 10 x 10 cm. Several crops were raised in the cisterns earlier to this experiment and the soil was

TABLE-I

Effect of pre-treatment of seedlings with micro nutrients on rice varieties

Yield attributes	conc %	IR-8 Zn	Fe	Mn	Check	Sona (IET 1991) Zn	Fe	Mn	Check
Grain yield/pot g	1	302	353	312	–	266	270	305	–
	2	355	359	386	–	303	314	283	–
	4	354	281	352	–	300	274	262	–
	mean	337.0	331.0	350.0	323.0	286.6	286.0	283.3	250.3
Tillers/pot	1	234	212	217	–	264	245	216	–
	2	202	244	205	–	235	206	199	–
	4	196	205	193	–	208	219	208	–
	mean	210.6	220.3	205.0	190.6	235.6	223.3	207.6	208.6
Panicles/pot	1	200	176	182	–	217	203	198	–
	2	185	186	169	–	209	201	195	–
	4	168	178	163	–	198	212	203	–
	mean	184.3	180.0	171.3	172.0	208.0	205.3	198.6	205.3
1000 grain wt. g	1	22.4	24.2	20.6	–	17.8	16.8	17.0	–
	2	25.5	24.4	23.4	–	18.6	14.2	16.4	–
	4	25.4	23.6	24.2	–	19.2	17.0	19.0	–
	mean	24.46	24.01	22.73	20.80	18.53	16.00	17.46	16.66

well settled. Soil in the cisterns was black clayey having 51–52 per cent clay, pH 8.2, EC of 0.8-1.0 mmhos/cm /15°c, 0.7 per cent organic carbon, 3-4 per cent of $CaCo_3$ and available P_2O_5 of 40.0 kg/ha. Before transplanting, soil was puddled 2-3 times and fertilizer was applied at the rate of 120 N (2 doses), 60 P_2O_5 and 30 K_2O kg/ha. Cisterns were regularly watered, keeping 1-2 cm level of water. Experiment was laid out in a randomised block design with 3 replications. Experimental results are presented in Table I.

Both the varieties differed in their responses to micronutrients. IR–8 showed more response to Mn than to Zn and Fe, while. Sona responded more to Zn than to Fe and Mn.

In case of IR–8, dipping of seedlings in 2 per cent suspensions of Zn, Fe and Mn oxides helped to increase the grain yield. For Sona, increased grain yields were obtained with 2 per cent Zn and Fe and 1 per cent of Mn solutions

Number of tillers per pot increased in IR-8 variety with the use of 1 per cent of Zn, 2 per cent of Fe and 1 per cent of Mn, while in Sona, 1 per cent each of Zn, Fe and Mn oxide solutions were sufficient to increase the number of tillers.

Average number of panicles, per plant did not differ very much in the various concentrations of the above micro-elements but varieties did differ, as seen by more number of panicle in Sona than IR–8.

It was interesting to observe very little of variation in 1000 grain weight among the treatments in same variety. Increase in grain yield in IR–8 than Sona was mainly due to higher 1000 grain weight.

Indescriminate application of micro-nutrients to soil creates problems of imbalance of other micro nutrients. Foliar application if not sprayed properly, there is danger of harming the foliage of crop plants. So, the preliminary trials conducted at Siruguppa by dipping the roots of rice seedlings in 2 % solutions of zinc, iron and manganese, before transplanting was found to increase the yield. It is inexpensive, effective and does not produce any residual effect in the soil. Further research on the effect of various combinations of micro-nutrients on r ce is in progress.

2 Selections 5117-1, 4117-7, 5117-11 and 5117-17 in R-51 Herbaceum cotton offer a promise :

Although the recent trend in cotton improvement is to replace desi herbaceum and arboreum cottons with those of hirsutums, the fact that desi cottons have been under cultivation in India withstanding repeated seasonal vagaries should not be lost sight off. The hirsutums are more sensitive to moisture scarcity and are more susceptible to pests and diseases compared to desi cottons.

In Karnataka, many herbaceum

varieties are under cultivation. A variety, R 51, developed at Regional Research Station, Raichur has been released by the University of Agricultural Sciences, for dry cultivation in districts of Raichur, Bellary, Gulbarga and parts of Bijapur in place of Jayadhar and Western-1 varieties. R-51 has proved for years to be highly drought resistant and high yielding yet closer field and laboratory studies during 1967-68 revealed greater variability that existed in the foundation stage crop of this variety in respect of maturity, height, per plant yield, halo and GP. This enabled the co-author to effect a number of individual plant selections. Their progenies were grown in replicated plots in 1968 at the RRS, Raichur. Better looking progenies were noted at maturity. Better plants in these better looking progenies were marked. The bulk seeds of the better plants of the promising progenies, based on the yield and laboratory analysis, following picking, were carried forward for 1969-70. This procedure was repeated.

Based on the average performance from 1969-1970 to 1971-72, some of the selections have been found to be superior to R-51. The average values of some of the economic characters of these selections are presented in TableI. The micro-spinning test results obtained for one year (1970-71) by the Cotton Technological Laboratory, Bombay, in respect of count strength product (CSP) and yarn strength in gm/tex. are also given in Table–I.

From the table I, it is seen that the performance of the four selections viz., 5117-1, 5117-7, 5117-11 and 5117-17 is superior to R-51 giving higher yields ranging from 5 to 7 % and increased ginning percentage by 1.8 to 2.8 %. Plant height recorded on 10 random plants gave some idea about the amount of existing variability in original R-51 in respect of this charecter. Bartlett's indices indicate 5117-17 to be very early followed by 5117-9, 5117-6 than R-51. The micro-spinning test results indicated that these four strains are superior in the range of 9-11 percent in respect of CSP besides possessing higher yarn strength.

TABLE-I

Performance of Raichur-51 Selections at Regional Research Station, Raichur Karnataka

Strain	Plant ht. cm.	Bartlett's Index	Average yield kg/ha	Lint yield kg/ha	Halo length mm	Ginning % average	Tenacity corrected to nominal yarn number 20s	
			Average of three years				CSP	GM/Tex
5117-1	99.9	0.84	751	258	20.1	34.4	1623	7.79
5117-6	84.4	0.84	713	247	19.9	34.3	1491	7.16
5117-7	73.6	0.75	813	272	20.0	33.4	1672	8.03
5117-9	74.0	0.85	709	244	19.4	34.4	1584	7.60
5117-17	73.3	0.79	791	271	20.1	34.2	1638	7.86
5117-17	90.4	0.92	793	269	19.8	133.9	1668	8.01
R-51	96.6	0.81	749	237	19.7	31.6	1498	7.19

3 Excess moisture is harmful to Wheat :

Very often earthen banks of the canals in Tungabhadra Project area give way and inundate the wheat fields for several days. To determine the duration of saturation/submergence that can be tolerated at different growth stages and to evaluate the effect of saturation/submergence on the growth and yield of wheat, a potculture trial was conducted during rabi 1971.

Twenty seeds of wheat varieties UP-301, were sown in cement cisterns of the size of 1.0 x 0.60 m diameter on 18.11.71. Fertilisers were applied at the rate of 120 kg N, 60 kg P and 30 kg K per ha before sowing. Excess moisture was maintained as per treatments to 4+1 cm submergence. Treatments were as follows :

a) Stages of crop growth :

i) Seedling stage (15-20 days),
ii) Tillering stage (40–45 days) and
iii) Flowering stage (65–70 days).

b) Submergence period :

1, 3 and 5 days and check. The crop matured in 100 days and harvesting was done on 25-2-72. The layout was the randomised block design with three replications.

Results of the experiments presented in table I indicate that different period of submergence did not affect the plant height, number of earheads and straw yields, while, the number of tillers, length of the earhead, 1000 grain weight and grain yield, were significantly reduced when excess of moisture was maintained for more than a day.

Of the three stages, submergence at

TABLE-I

Effect of saturation/submergence at different growth stages on wheat yield and yield attributes

Stage of crop (s)	Period of submergence day (P)	Grain yield/ pot g	Straw yield/ pot g	Height of plant cm	Tillers/ pot	Ears/ pot	Ear length cm	1000 grain Wt. g
Seedling	1	64.7	50.0	52.6	86.3	63.3	8.72	47.6
,,	2	54.3	50.0	46.0	82.3	66.6	8.42	39.4
,,	3	51.0	46.3	45.0	78.3	61.6	8.35	36.4
Tillering	1	66.7	59.0	53.0	89.3	71.3	9.33	49.9
,,	2	47.3	58.0	48.7	86.3	67.3	9.00	47.4
,,	3	45.0	58.0	48.3	82.0	69.3	8.92	39.7
Flowering	1	70.0	58.3	53.3	91.0	68.6	9.70	51.2
,,	2	61.7	57.7	53.2	86.0	69.0	9.35	49.9
,,	3	61.3	58.0	51.3	82.0	66.9	9.13	48.9
Check	—	71.7	59.8	56.0	94.7	72.3	9.79	52.7
C.D. for S at 5%		5.021	4.510	NS	NS	NS	0.120	0.970
C.D. for P at 5%		5.021	NS	NS	5.56	NS	0.120	0.970
C.D. for S x P at 5%		NS	4.54	NS	NS	NS	NS	2.400

NS=Not Significant

seedling and tillering was most harmful and reduced the grain yield as compared to submergence at flowering. The reduction in grain yield was due to the reduction in the length of the earhead & 1000 grain weight. The differences in grain yield due to submergence at seedling and flowering stage were not significant. The straw yield was reduced significantly only when submergence was maintained at seedling stage. This seems to be the combined effect of reduction in plant height and number of tillers, though differences were not significant.

The interaction between the stage of crop and the period of submergence was not significant in respect of grain as well as straw.

4) Medium duration rice varieties possess higher yield potential than short duration varieties and may be suitable for kharif planting and situations with adequate irrigation water :

In rice, it has been observed that increase in grain yield is correlated with increase in duration. Medium duration varieties seem to exhibit this kind of relationship. To examine this view, the effect of duration (days to 50 per cent flowering) on yield was studied in experiments involving two maturity groups of rice conducted in kharif 1973, at Mandya. The experimental mean yield, of the test groups, in relation to different durations are given in Table I, along with tests of significance.

The data in Table I, indicate that the medium duration varieties recorded higher yield performance than short duration varieties. The yield difference between group (Corrected to four decimals) varied from 45.9 (in PVT 2) to 78.1 (in UVT 2) g per sq.m, and the divergence for both yield and duration were significant at 1 % level (vide student's 't').

TABLE-I

Test group	No. of entries	Yield/sq m. (g)	Days to 50% flowering	Student's 't' for SDV versus MDV: Yield	Days to 50% flowering
Short duration varieties	SDV				
PVT 1	35	0.56+/—0.01	84.94+/—1.02		
Medium duration varieties	(MDV)				
PVT 2	36	0.64+/—0.02	103.75+/—0.92	3.00	13.72
UVT 2	24	0.64+/—0.01	103.67+/—0.69	4.41	15.10

TABLE–II

Test group		Difference in days to 50% flowering	Regression of yield on 50% flowering	Yield increase/ha in MDV over SDV (kg): Expected	Observed
Short duration varieties	(SDV)				
PVT 1		—	0.0062	—	—
Medium duration varieties	(MDV)				
PVT 2		18.81	0.0041	771	459
PVT 2		18.73	0.0045	842	781

To examine the effect of duration yield, estimates of regression coefficients were obtained, and these are given in Table II, along with the expected grain yield. The expected yield was calculated by multiplying the difference in duration with regression coefficients.

The regression coefficient revealed that the grain yield was increased by 4.1 (in PVT 2) to 4.5 (in UVT 2) g/sq. m, for an increase in duration by one day. In other words, this would mean an increase in per day production by 41 to 45 kg./ha, and is substantial. It is seen from table II that the expected yield estimate closely paralleled with the observed yield divergence in the case of UVT 2, and is less than the expected, by 40.46% in PVT 2. The reduction in yield in the latter experiment is mainly attributed to the grain shedding noticed in some of the varieties. Therefore, it is inferred from this study.

That increase in duration (in MDV) has a positive effect on the yield.

That medium duration varieties exhibit higher yield performance than the short duration varieties.

The yield differences observed in this study varied from 459 to 781 kg/ha, and these were in agreement with the expected yield, based on duration. Therefore, it is suggested that for kharif plantings, and in places where adequate irrigation facilities exist, medium duration varieties may be grown for maximum production.

5 Some promising Australian wheat varieties :

Mexican wheat varieties have performed well in the northern parts of Karnataka. As a part of the crop introduction programme 14 varieties (Table I) were introduced from Australia to study their suitability. Studies were carried out on medium black soils at Dharwar during Rabi season of 1971 under rainfed conditions in plots of $2\frac{1}{2}$ x 1 m in duplicate.

A fertilizer dose of 60-30-30 kg/ha N, P_2O_5, K_2O was given as a basal dose to all the varieties at the time of sowing. The crops were harvested as and when they matured. Certain biometric observations were recorded. Out of these wheat varieties, seven were of awnless ears (Dirk, Windebri, Gala, Frisco, Emblem, Gamut and Beacon) while the varieties Rapier and Gamenya were with little ears and other eight were with awns.

Results indicated that as regards plant height, Bijaga measured the maximum (80 cm), followed by Gamenya (62 cm) and Gamut (60 cm). The dwarfest amongst these wheat varieties was Insignia (28 cm). The duration of the varieties varied from 90 (Kalyan-227, Lawrence and Gala) to 120 days (Bijaga yellow). Varieties Bijaga yellow, Gamenya and Gamut put out better growth. Gamut an Australian variety, gave the highest yield (2175 kg/ha) being 66% over local Bijaga yellow and closely followed by Gamenya, Kalyan-227, Stockade and Dirk which gave almost comparable

grain yield of 1942, 1822, 1812 and 1732 kg/ha respectively. The commonly cultivated variety Bijaga gave 1300 kg/ha. The medium yielders were Safed Lerma (1665 kg per ha), Lawrence (1975 kg per ha) and Gabo (1300 kg per ha). The lowest yields were obtained with the varieties Emblem (927 kg per ha), Flympic (930 kg/ha) and Frisco (720 kg/ha),

Thus few of these exotic varieties are promising as compared to the local variety. Some of them may be introduced for cultivation in the various wheat growing areas under both irrigated and rainfed conditions in Karnataka State.

TABLE-I

Performance of Australian wheat varieties in comparison with others

Sl. No.	Varieties	Grain yield kg/ha	% increase over local (Bijaga Yellow)	Plant height (cm)	Grain number	1000 grain (g)	Duration (days)	Plant type
1	Gamut	2175	67.0	60.0	28.8	57.4	110	Awnless
2	Gamenya	1942	50.0	62.0	27.3	52.7	110	Little ear
3	Kalyan-227	1822	40.0	39.0	28.7	44.5	90	Long ear
4	Stockade	1812	39.0	47.0	31.3	56.0	105	Little ear
5	Dirk	1732	33.0	46.0	33.0	45.0	105	Awnless car
6	Safed lerma	1665	28.0	36.0	28.5	52.4	95	Long ear
7	Lawrence	1575	—	56.0	30.2	53.0	90	Little Awn
8	Bijaga yellow	1300	0.0	79.0	30.0	49.0	120	Tall growing
9	Gabo	1300	—	30.0	29.0	42.5	100	Little Awn
10	Gala	1280	—	36.0	28.5	40.0	90	Awnless
11	P.V.-18	1237	—	45.0	29.5	41.0	110	—
12	Beacon	1200	—	45.0	29.5	41.8	95	Awnless ear
13	Insignia	1125	—	28.0	30.0	49.4	110	Little Awn dwarf variety
14	Rapier	1120	—	48.0	25.0	55.0	100	Little ear
15	Windebri	1070	—	52.0	21.0	52.0	105	Awnless ear
16	Flympic	930	—	34.0	23.5	48.5	110	Bushy type
17	Emblem	927	—	30.0	25.5	48.0	113	Awnless ear
18	Frisco	720	—	33.0	23.8	42.5	110	Awnless ear

Source : Current Research, July 15, 1974, U.A.S., Bangalore

VII News in brief

1) 23,000 tonnes of weedicides (Technical grade) will be required by the end of the fifth five year plan:

Weeds eat away 30 to 40% of the plant nutrients applied to the soil. The fertilisers have become very expensive and are not available in the international market to the extent required by India. In order to avoid loss of fertilisers due to weeds, the Union Ministry of Agriculture has taken up a massive campaign for the control of weeds through manual, mechanical and chemical control. The Union Ministry has urged all the State Governments to take up intensive campaign during the kharif and the rabi seasons.

It has been estimated that in order to make an impact at least 10 million hactares of high yielding varieties i.e. 25% of the high yielding varieties by the end of the 5 th five year plan, should be brought under weed control. In order to do this, 23,000 tonnes of weedicides (technical grade) will be required by the end of the 5 th five year plan i.e. by 1978–79. The consumption of the weedicies in 1973–74 was only 800 tonnes and in 1974–75 it is expected to be 2000 tonnes.

When 10 million hectares of high yielding varieties will be brought under weed control programme, it will save about 3 lakh tons of nutrients by the end of the 5 th five year plan, costing Rs. 120 crores in foreign exchange. Over and above this, the fertiliser thus saved, will be able to cover additional 3 million hectares of high yielding varieties, and will give an additional production of about 3 million tonnes of foodgrains.

A co-ordinated approach is being worked out between the State Agiculture Departments, Agricultural Universities, Weedicides Industries and Fertilisers Industries to take up promotional activities on an intensive basis. The first of its kind is being taken up in Karnataka in collaboration with these institutions.

2) UAS–Mangala–KSDA Collaboration Project for Efficient use of fertilisers

In order to re–orient our agricultural production programmes on lines of modern technology to obtain optimum yields through more efficient utilisation of limited supply of fertilizer a collaborative project on 'Efficient Use of Available Fertilizers" was evolved and carried out by the University of Agricultural Sciences (UAS), the Mangala Farm Service of MCF Ltd., and the Karnataka State Department of Agriculture (KSDA) in the districts of Bangalore, Kolar and Tumkur.

A package of practices was evolved

in consultation with the Specialists of UAS and the KSDA to ensure maximum economy in the use of fertilizers, without affecting crop production.

UAS and KSDA organised a Socio-economic survey of the project area, to evaluate the programme in its totality. The survey is still going on.

Line of Improvement practiced are :

1 Fertilizer dosage based on soil test values ;

2 Incorporation of organic manures about 3 weeks before application of basal dosage of fertilizers/planting ;

3 Split application and placement of fertilizers depending upon soil and plant type;

4 Curing Urea with moist soil for about 24 hours before application for top-dressing ;

5 Foliar feeding of Urea (2%) along with plant protection sprays ;

6 Application of Zinc Sulphate (Micronutrient) ;

7 Use of Azatobacter (Bacterial fertilizer) ;

8 Improved water management techniques to overcome the toxic affects, in ill-drained situations :

9 Management of salt affected soils-drainage, gypsum treatment, Irrigation manipulation.

10 Timely cultural operations including control of weeds particularly in the early stage of plant growth.

An assessment of the crop-stand and some yield figures shows that the farmer is benefited by adopting the new technology. A minimum yield of 30 and 25 quintals of Paddy per acre was achieved compared to the previous year average yield of 17.5 and 15 quintals per acre in the Project areas of Kencharlahally (Kolar Dist.) and Holavanhally (Tumkur Dist.) respectively. Nitrogenous fertilizer savings are estimated to be of the order of 25 to 30% of the general recommendation dosage.

3) Beware of the overdose :

If a little nitrogen is good for plants, a little more is even better. This is what most farmers imagine. Farmers in Rajasthan, Haryana, Punjab, Orissa and Gujarat especially use nitrogen in unbalanced quantities.

It is true that Indian soils are deficient in nitrogen. Therefore nitrogen, phosphates and potash should be added to the soil in the ratio of 4:2:1. This ratio takes into account the preponderance of nitrogen deficiency in the soils of all developing countries. However, the nitrogen consumption ratio in the country is at present 6:2:1. In Punjab it is 18:4:1, in Haryana 36:3:1, in Rajasthan 11:3:1, in Gujarat 13:2:1 and in Orissa 8:2:1.

Excessive quantities of nitrogen induce the luxuriant development of leaves and a root system which is too small to resist droughts. Ripening is delayed and the quality of the crop is poor. The plant is stimulated to synthesise proteins to develop fresh vegetative tissues at a rate which

interferes with the process of strengthening the tissues which are spongy and weak. The plant's power of resistance to aberrant weather, cold, heat, rain and hail is reduced. Plants also become susceptible to rust and mildew.

On the other hand, experiments carried out at Ludhiana and elsewhere have shown that after a series of exhaustive cropping, soils become deficient in phosphates. A deficiency in potassium manifests itself a little later. In Ludhiana, a deficiency in phosphorus has begun to act as a brake on increasing crop production.

With the introduction of high yielding varieties, the use of balanced fertilizers has become a must in India. It has been demonstrated that the application of nitrogen is not sufficient to sustain crop yield levels from year to year. Crop yield levels with nitrogen application alone have gone down considerably. The judicious use of fertilizers is likely to reduce losses of nitrogen through leaching and denitrification.

Source : Potash Newsletter, Jan-March, 1974.

4) V Plan targets under agriculture

Agricultural Production :

The strides made in the field of agricultural development during the last Four Plan Periods is indeed spectacular although there are areas where much headway could not be made. The achievements were significant especially in Land Development, Expansion of Irrigation facilities, plant breeding and food production. The progress was rather tardy in the case of Pulses, Oilseeds, Cotton, etc. With a view to boosting agricultural production so that the State attains self-sufficiency in food production and to meet the ever increasing demands of the agro-based industry, new goals have been set for the V Plan.

The target under food production aims to achieve a level of 75 lakh tons of foodgrains at the end of the Fifth Plan (1978-79). The food production during 1973-74 was only 61 lakh tons. Sugarcane production which was only 88 lakh tons during 1973-74 is to be boosted to 112 lakh tons at the end of V Plan. Production of Cotton which was only 7 lakh bales at the end of 1973-74 is to attain a level of 12 lakh bales. The target under Oilseeds is to achieve a production level of 11 lakh tons at the end of V Plan from the present level of 7 lakh tonnes. Also, the gross cropped area will increase marginally from 108 lakh hectares to 110.50 lakh hectares at the end of the Fifth Plan.

Irrigation :

The State has an ultimate irrigation potential of 45.79 lakh hectares under Krishna, Cauvery, Godavery, West flowing rivers, North Pennar, South Pennar and Palar river valleys. Total area irrigated at the end of the Fourth Plan was 17.80 lakh hectares and it is programmed to bring in an additional area of 7.93 lakh hectares under irrigation during the fifth plan taking the total area to 25.73 lakh hectares.

Fertilisers :

The consumption of fertilisers in terms of N.P.K. at the end of fourth plan was of the order of 1.24 lakh tons of Nitrogen, 0.62 lakh tons. of phosphoric acid and 0.54 lakh tons of Potash. The anticipated consumption at the end of the Fifth Plan is of the order of 2.30 lakh tons of Nitrogen, !.15 lakh tons of Phosphoric Acid and 0.80 lakh tons of Potash.

Pesticides :

The consumption of pesticides, fungicides and others in order at the end of the Fourth Plan was, 1650 tons, 800 tons and 36 tons. The projected consumption at the end of the Fifth Plan is expected to grow to 1900 tons of Pesticides, 1100 tons of fungicides and 63 tons of others.

High Yielding varieties :

The area covered under high yielding varieties programme at the end of the Fourth Plan was 2.80 lakh hects. under paddy, 0.60 lakh hects. under wheat, 2.0 lakh hects. under hybrid maize, 2.61 lakh hects. under hybrid jowar and 1.96 lakh hects. under hybrid bajra and the Fifth Plan targets (Level at the end of 1978-79) is 5.00 lakh hects., 0.80 lakh hects., 2.00 lakh hects., 3.95 lakh hects. and 1.10 lakh hects., respectively.

Agricultural credit :

Co-operatives and Commercial Banks are extending credit to farmers. At the end of the Fourth Plan the credit made available to the farmers was expected to be of the order of Rs. 170.25 crores. This is expected to grow substantially during the V Plan and during the last year of the plan it is expected to expand Rs. 340 crores. The Co-operative sector is expected to provide Rs. 77 crores consisting of Rs. 50 crorse as short term credit, Rs. 2 crores as medium term and Rs. 25 crores as long term credit. The commercial banking sector is expected to provide Rs. 60 crores.

5 New planting method to boost paddy yield :

A new way of planting rice that challenges the practices of centuries is the latest hope for a breakthrough in the race to boost food production in Asia ahead of the need of its rising population.

The new method called the direct seeding will increase the farmers' yields from 3 to 5 times on land depending for its water on rainfall instead of on irrigation. From some experimental plots the new method yielded rice at the rate of more than 10 tons per hectare

from land which previously yielded 1.4 tons.

'There is no doubt that we are going to change the way rice is grown in Asia' said Mr. Vernon Ross, the one to oversee a major test of the new rice planting method at the International Rice Research Institute (IRRI) at Los Banos near Manila. Mr. Ross is a former University of Tennessee Agriculture Specialist and Director of Trainning at the (IRRI).

About 67% of rice land in Asia is rainfed. Much of increased yields of new seed varieties has been concentrated on irrigated land.

The Phillippines Government is turning over 24,000 hectares to direct seeding. On the basis of experiments carried out on 9 scattered plots last year Mr. Ross is wagering the rice yield will triple on the test hectarage.

Under the direct-seeding method the farmer will plant dry seed into dry but prepared soil from mid-April using plenty of chemicals to kill weeds as well as fertiliser and pest killers. The technique is designed to permit his land to take advantage of the increasing moisture of the rainy season starting late in May, to allow him a harvest before the flood and typhoon season and give him time to plant a second crop of rice or some other item.

For centuries, rainfed-land farmers have nurtured their seeds for three weeks to more than a month in specially prepared muddied paddies, then transplanted them when the rains were at their height. Mr. Ross said the rains controlled weeds which are a major deterrent to a high-yielding crop. Because of the shifting pattern of rain the farmer often guessed wrong about the right time to transplant his seedlings into his fields or kept them in the seedbed until they were too mature to yield much. Transplanting usually meant the farmers' crops grew during a time of decreasing rain fall.

According to Mr. Ross the technique will be just as applicable to rainfed parts of Vietnam, Cambodia and Thailand, India and Bangladesh, as in the Philippines. Despite the strong bonds of tradition, he forsees no difficulty in getting farmers to adopt the new method, if they can be shown decisively that it gives them more rice.

Source : Indian Express, 23-7-1974

6) State level farmers forum convention at Bangalore

A State level convention of the "Farmers Forum" was held at Lalbagh, Bangalore on the 11th July 74, attended by a large number of delegates, estimated at over 3000 from different parts of the State. The Hon'ble Prime Minister Smt. Indira Gandhi inaugurated the same. The Hon'ble Minister for Agriculture Sri N. Chikke Gowda and the Hon'ble Cheif Minister Sri D. Devaraja Urs grcaed the occasion and also addressed the delegates. On the occasion six distinguished persons were honoured by the forum for their outstanding contribution for the promotion of agriculture in the State. They are Sriyuths : B. H. Katharki, M. Vasudeva Murthy, Rayana Gowda Patil, Veerasanjeeva Gowda, Lakhmanaiah and Alur Shama Rao. §

VIII DEPARTMENTAL NEWS

a) Director's Tour

The Director of Agriculture accompanied the Hon'ble Minister for Agriculture on 15-6-74 to the Kencharlahalli Project taken up jointly by the University of Agricultural Sciences, Department of Agriculture and Mangalore Chemicals and Fertilisers to promote efficient use of fertilisers. He accompanied the Hon'ble Minister for Agriculture again on 19-6-74 to New Delhi and attended the meeting of the World Bank Team on Upper Krishna Project in the Chambers of Joint Secretary, Union Ministry of Agriculture. He was in Madras on 24-6-74 to attend the Zonal Conference on Fertilisers.

b) Schemes : *Nil.*

c) Promotions and Transfers : *Nil.*

d) Publications, Extension materials and Radio talks :

Fortnightly seasonal tips for the benefit of farmers in the State for the month of July were prepared in consultation with the Specialists of the Directorate and sent to the Department of Information and Publicity and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this news of Agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'.

On the farm front

Volume-8 September 1974 No. 9

FARM ADVISORY AND EXTENSION SERVICES

DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

Cover :

The pilot project taken up jointly by the UAS, KSDA and the Mangala Fertilisers on Paddy and Jowar during the last summer has shown that yields could be increased substantialy at reduced levels of input application by an efficient use of fertilisers and other inputs.

In my recent visits to the Districts and Taluks, I have tried to understand the extension thrust at different levels. I gained the impression that the efforts as at present could be further improved both in terms of production technologies to be extended to the farmers and the extension strategy that could be used for this kind of a job. It is the very essence of our work in the Department of Agriculture that we put together the technical information that could be made available to farmers for increasing farm production and income, as well as develop means and methods by which such technical information is transmitted to the farmers. Therefore all attention is required in this area.

In concrete terms, I would like to suggest a few things which in my opinion are not at all new. All that is required is that we put to use what we already know.

The effort that we need to make is two fold. One is to recognise our organisational hierarchy at different levels according to its different roles. The second is to adopt a strategy that would make our efforts much more effective in practice.

Let us take the organisational set up first. We may identify the following administrative segments with distinctive functions to perform.

1. Operational Extension Team :

I would include in this group, the Assistant Director of Agriculture of a sub-division, the several Agricultural Extension Officers in his jurisdiction and the Gramsevaks working with them. This is the unit that converts technologies into crops, production and income. Their main job is to identify technologies suitable for their situation, to communicate them to the potential users and to demonstrate the workability and profitability of these in the local situations.

2. Extension Supervisor :

The Deputy Director of Agriculture in each district would be equal to an extension supervisor whose responsibility is to ensure that the teams perform as effectively as possible. He would have the responsibility to ensure that good technological information flows continuously to the taluks and also that the

teams adopt proper steps to implement the different programmes.

3. Programme administrator :

The Joint Director of Agriculture of the Division may be considered as the person responsible for implementing all the programmes of the Department of Agriculture, as relevant to his jurisdiction. He has the overall responsibility of ensuring that the extension schemes operate well and further that the district supervision is effective. He should also ensure that the supply planning and information support are adequate. Any failure of agricultural programmes in any of the taluks or districts in his division should be taken as the responsibility of the Joint Director of Agriculture.

The second approach, I would like to enunciate, relates to the strategy of extension work. Many times there is a confusion and diffidence in the minds of the middle level functionaries that the work is beyond their competence for achieving tangible results. On the contrary, even complex tasks can be properly broken down into simple, workable units, for effective implemention. For this purpose, particularly for the benefit of Operational Extension Teams, the following suggestions are made:

1. Select taluk as a unit of operation :

Agriculture is an enterprise that is based on natural production resources like soil, water and climatic conditions. They vary vastly in a geographic region. Even though it is desirable that each village is taken as a unit for agricultural development programmes, for reasons of practical feasibility, a taluk may be treated as a unit. There is greater uniformity of agricultural conditions in a taluk than in a district. We have a couple of Agricultural Extension Officers in each taluk with at least ten Gramsevaks assisting them. Therefore, the taluk may be treated as a sizeable extension unit for implementing agricultural programmes. This will reduce the complexity of extension programmes to some degree.

2. Concentrate on one season at a time :

There are three main agro-climatic seasons, namely, the monsoon, the winter and the summer. Instead of taking an agricultural programme for the entire year in each taluk, we have to consider one season at a time. This will reduce the complexity

of agricultural technology that we have to tackle in a given taluk.

3. Identify important crops for each taluk :

For each season there will be only a few crops that would be important. Select only the major crops of the area and season for attention. Thus, at a given time, there will be only a couple of crops and technologies applicable to them and these will be well within their capacity to handle.

4. Put together relevant technological information :

For each of the crops in a season, identify the most suitable varieties that could be recommended and the most suitable production techniques that could be adopted. Thus in a paddy area, the extension team will have to identify the varieties and production techniques that are suitable for a particular season, in a particular taluk.

5. Reduce the recommendations to writing :

A precise statement of the recommended technology is very necessary, if the confusion and indefiniteness on the field are to be avoided. Of course, it should be clearly understood that such recommendations are adaptable to the local situations. This phase which is as an important step in extension work is often neglected.

6. Plan your input supply :

The best of plans are doomed to failure if they are not adequately supported. Supply of production inputs like seed, fertiliser and pesticides, should not be taken for granted. Therefore, supply planning should be completed taking all the inputs into account, including credit wherever needed. It should also be recognised that these inputs are handled by independent agencies. Therefore, supply planning and co-ordination is to be done by involving these agencies, fully. The Department of Agriculture should not take up the supply responsibility, directly.

7. Communicate the message adequately :

A few weeks before the actual season starts, the extension workers should begin contacting the local farming communities. Assuming that, on an average, there are ten villages in each

Gramsevak's circle, at least two rounds of night meetings in advance should be conducted in these villages by the Gramsevaks supported by the Agricultural Extension Officer. Since the Agricultural Extension Officer may not be able to be present at all the ten villages, he should assist in these night meetings at least in the first few villages. Thereafter he may join the Gramsevaks in the night meetings, occasionally. The first round of meetings should be to introduce the topic to a group of farmers and elicit their reaction on the basis of available information. If some farmers come forward to adopt the new technology, their names are to be put into a list. It is better if the local youth group is organised to support this activity. The second night meetings should be used to check the progress made since the first meeting and to reinforce the effort. It should also be used to finalise the supply of inputs required. Also in this series, the exact dates of operations should be finalised and the local progressive farmers who can assist the Gramsevak given specific responsibilities. The Agricultural Extension Officer will have the responsibility of making regular periodical visits to the villages to supervise and assist the Gramsevaks. The Gramsevak will maintain a regular schedule of visits to these villages.

8. Conduct bulk demonstrations:

Large scale demonstrations help in proving the practicability and profitability of the recommended technology. One or two isolated illustrations may not carry conviction. For each Gramsevak's circle, one or two large scale demonstrations should be planned by the A.E.O. and the Gramsevak concerned. This demonstration should cover between 25 to 50 acres in extant. This should encompass as many farmers as possible instead of limiting to one or two big farmers. There should be no subsidies or grants in these demontrations. The technical support on the other hand should be assured for the group of people involved in a bulk demonstration, from the beginning. The other farmers of the village and the circle should be motivated to take interest in observing these demonstrations throughout. Here also good procedures of conducting night meetings and follow up meetings would be very essential if a good degree of success is to be ensured.

9. Evaluate the efforts :

Throughout the season as well as at the end of the season,

an assessment of effectiveness of extension work should be made. This should focus not only on the success of the recommended technology as practiced by farmers but also on the reaction of the farmers to the whole programme. Timely adjustment in the programme would be necessary if some obstacles are encountered in the programme. The farmers should be not only encouraged to observe the work in the demonstration but also should be invited to comment as critically as they can with out their being mistaken. It is only through such criticisms that deep seated resistance to a new technology could be brought to surface providing an opportunity to the extension workers for removing the doubts.

10. Learn the lessons for future :

Each of these experiences should be used for future action. Each individual farm community is an entity in itself. Extension workers should learn to recognise the individuality of their clients and become competent in dealing with communities as they would deal with individuals of different personality types. This would go a long way in reducing the time required for introduction of new technologies in other areas and seasons. Further, such experiences also yield lessons related to the behaviour of new technology in different locations. The extension workers with these experiences can enrich their ability to manipulate technical knowledge.

The foregoing may look to be a formidable system of extension work. In fact, it is not. If the basic principles of extension are assimilated by the extension workers, the activities enumerated above would automatically fall into a logical line of action and become a natural course of events. The only way to become competent in extension work is to practice it seriously and sincerely.

R. Dwarakinath
Director of Agriculture

The month in retrospect

(Seasonal and crop conditions during July 1974)

Good showers were received in many districts of the State. Kharif sowing which was held up for want of moisture, had been revived and was going on briskly. Standing karif crops which were withering in some of the districts like Hassan, Mysore, Chick-magalur were recovering. Transplanting of paddy, sowing of ragi, hybrid maize and sunflower, were some of the important agricultural operations carried out. The agricultural situation in brief for each division is given below.

Bangalore division:

Fairly good showers were received in the districts of Bangalore, Shimoga, Tumkur, Chitradurga and Kolar. The weather was mainly cloudy with intermittent sunshine. Sowing of ragi; hybrid maize, transplanting of paddy, raising of tobacco nurseries, were some of the important agricultural operations carried out. There was mild attack of aphids on ragi, pulses and groudnut, earhead pests on hybrid maize, tikka on groundnut against which necessary plant protection measures were taken up.

Mysore division:

Good showers were received in the districts of Mysore, Mandya, Coorg Hassan, Chickmagalur and South Kanara. The standing crops which were withering in the districts of Mysore, Hassan and Chickmagalore were recovered. Kharif sowings which were held up in Mysore, Mandya, Chickmagalur, Hassan districts for want of moisture had been revived. Important agricultural operations carried out were, raising of paddy nurseries, interculturing operations in drilled paddy, ragi, hybrid maize and groundnut, transplanting of paddy and ragi, sowing of sunflower, ragi, hybrid maize, and top dressing of hybrid jowar. Aphids on hybrid jowar and hybrid maize were noticed in patches against which necessary plant protection measures were taken up.

Dharwar division:

Moderate showers were received in Dharwar and Bijapur districts. The weather was mainly cloudy. Sowing of hybrid maize, hybrid jowar, interculturing and top dressing of hybrid jowar, groundnut, sowing of cotton, raising of tobacco nurseries, were some of the important agricultural operations carried out. Aphids on groundnut and kharif jowar and shoot fly on hybrid jowar were noticed against which necessary plant protection measures were taken up.

Belgaum division:

Fairly good rains were received in Belgaum and North Kanara districts. The weather was cloudy with intermittent sunshine. Sowing of sunflower, kharif jowar, hybrid maize, groundnut, transplanting of chilly, preparation of land for sowing of cotton and transplanting of tobacco and transplanting of paddy were some of the major agricultural operations carried out. Red headed hairy caterpillar on groundnut were noticed against which necessary plant protection measures were taken up.

Raichur division:

Though rains failed in early part of the month, it revived in the later part of the month, which benefited the standing kharif crops. Sowing of kharif crops which were held up for want of moisture was resorted to. Important agricultural operations carried out were sowing of sunflower, bajra, groundnut and navane. Stemborer and shoot fly on hybrid jowar, jassids and aphids on paddy, red headed hairly caterpillar on groundnut were noticed. However necessary plant protection measures were taken up.

Gulbarga division:

Rains failed to occur in the early part of the month, causing severe damage to the kharif crops. In many places the crop did not germinate for want of moisture. But during the later part of the month, good showers were received, which helped to take up sowing.Sowing of kharif crops, weeding interculturing and top dressing of early sown kharif crops and sugarcane were carried out. Shoot fly and midge on hybrid jowar was noticed for which necessary control measures were taken up. Rodents have caused extensive damage to the standing crops. However cultivators were asked to take up necessary control measures to check the further spread of the menace.

INPUTS FOR FARMERS:

With a view to steping up the area under high yielding varieties in the State and also to see that the production of food grains and other essential agricultural commodities is substantially stepped up to meet the ever increasing demands, Government have recently restored full dose of Nitrogen which was in short supply in the country, (as recommended in the package of practices booklet prepared jointly by the University of Agricultural Sciences and Agriculture Deparment. For all high yielding varities of crops including cotton, sea island cotton, crops like sunflower, potato sweet potato, topioca, mulberry and vegetables).

For example, high yielding paddy was getting a dosage of 48 kgs of N per hectare. Now as a result of the Government Orders the crops will get 100 kgs. Similarly for other high yielding crops, the full dosage of N fertilizers has been restored.

Also a few crops which have direct

bearing on the economy of the State, namely, Sugarcane, Groundnut and Grapes, the dosage of N has been increased to 100 kgs in case of Sugarcane, 20 kgs in the case of irrigated groundnut, 10 kgs in the case of rainfed groundnut, 50 kgs in the case of Grapes per hectare.

This has become possible as a result of introduction of card system which has effectively controlled the several mal-practices prevailing in fertilizer trade. Also due to relentless efforts made by the State Government with Government of India, the fertilizer position of late has improved.

IV ARTICLES CONTRIBUTED BY THE DEPARTMENTAL OFFICERS

I) Use of Audio-Visual Aids in Extension

S. Mune Gowda, Agricultural Officer

Introduction :

The growth in the use of audio-visual aids for instruction is an outstanding development in modern education. It is believed that 85% of our learning begins at terminal points like visual and auditory sense organs. The teaching will be effective in a situation, where, various teaching materials and / or methods are used rather than only the spoken word to convey meaning. A good teacher will always like to use audio-visual aids for teaching. Use of aduio-visual aids in teaching will create an ideal learning situation. Any materials or methods used to reinforce the spoken word in teaching, which contribute to better learning can be called as audio-visual aids.

What are audio-visual aids ?

According to Kinder, audio-visuals may be of any device which can be used to make learning experiences more concrete, more realistic and more dynamic.

The following definitions of basic terms are offered by Hass and Packer.

An instructional aid is any device that assists an instructor to transmit to a learner facts, skills, attitudes, knowledge, understanding and appreciation.

A visual aid is any instructional device that can be seen, but not heard.

An audio aid is any instructional device that can be heard but not seen.

An audio-visual aid is any instructional device that can be heard and seen.

Importance of audio-visual aids in extension education :

Extension is education and education is the production of change in human behaviour. This change in human behaviour will be resulting from :

1) Knowledge or things known,
2) Skills or things done and
3) Attitudes or things felt.

Extension education is to influence people to make those changes as desired, in their behaviour that contributes to better farming and home making.

In extension teaching, the extension worker is the teacher, the villager is learner. Teaching according to

Hammonds is "the process of directing or guiding the activities of the learner or learners so as to result in their learning in their becoming changed in behaviour". It is the job of the teacher to see that all the facts, concepts and relationships passed on by him should be meaningful and functional to the learner. This can be done through proper motivation, clarification and stimulation with the help of adudio-visuals.

According to W. A. Wittich and Schuller, the normal learner gains understanding in terms of multiple impressions recorded through eye, ear, etc. These do not occur in isolation, but rather through a blended pattern from any or all of the percepter mechanisms stimulated by the external occurences. Seeing and hearing are the most important precepts which contribute to maximum learning.

In extension the two most important jobs of teachers are: 1) dessemination of knowledge and 2) ensuring that the same is put in to practice. For that he should be able to:

1) Attract attention,
2) Create interest,
3) Develop desire,
4) Ensure action,
5) Maintain satisfaction.

The first step in teaching is to attract the attention of people. Research indicates that, sight and hearing are the major senses involved to attract attention and increase learning. The use of aduio-visuals is based on these facts.

Research indicates that when properly used, audio-visuals contribute to one or more of the following:

1. Help to give correct initial concept.
2. Help in learning more.
3. Speed the learning process.
4. Provide experiences which are not known to learner.
5. Clarify and give definite meaning to words and thus combat verbalism.
6. Intensify impressions;
7. Arouse interest by attracting attention.
8. Build and sustain interest;
9. Motivate, develop and change attitudes.
10. Help to reach more people;
11. Save the time of teacher and viewer.
12. Supplement other learning and serve as reminder.

Classification of audio-visual aids:

Audio-visual aids consist of a variety of materials and methods. According to their form, they may be classified as follows:

Audio	*Visual*	*Audio-visual*
Talks	Written literature	Films
Tapes	Films	T.V.
Radio	Posters	
Music	Charts	
	Actuals	
	Models	
	Exhibitions	

The following classification, adopted from Visual aids for village workers by D. T. Saunders, the Christian Association for Radio and Audio-visual Service, Jabalpur, M.P., may be helpful in better understanding their

use under conditions existing in agricultural extension.

Audio-visual materials and methods:

1 Audio-visual methods.
2 Audio-visual materials.

Audio-visual methods.

Examples: Field trips, Dramatics, Demonstrations.

Audio-visual materials:

1 Audio materials.
2 Visual materials.

Audio materials

Examples: Radio, Recordings (tape, disc, wire), Public address equipment.

Visual materials

Literature: Examples Leaflets, News letters, Circular letters, Bulletins, News articles, Wall news paper, Folders, Calendars, News stories.

Symbolised: Examples Charts, Graphs, Maps.

3-Dimentional : Examples Models, Specimens.

2-Dimentional:

i) *Projected:* Examples Films, Film strips, slides, opaque, overhead.

ii) *Non-projected:* Examples Black boards, Bulletin boards, Photographs, Flannel graphs, Flash cards, Posters, Pictures.

There may be other methods in use but the above are commonly used in extension teaching.

Summary:

The audio-visual aids will create an ideal learning situation. They make learning easier. Therefore they can be effectively used in extension. Audio-visual aids should be planned, produced practiced and presented. Then only, the extension worker will get maximum benefits by using them in his teaching.

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2. *Dwarakinath, R. et al. (1959), Some thoughts on Agri. Extension methods and the community development programme in India. Department of Agriculture, Mysore, Booklet No. 6, Bangalore.*
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2) Economics of multiple cropping under rainfed conditions in Honnali taluk

By Sri A. T. Kagali, D.D.A (Farm management), Bangalore & Sri V. S. Ramu, A.A.O. (Farm management), Bangalore.

Definition:

'Multiple cropping may be defined as a method of growing two or more different crops in a year on the same piece of land.'

The idea of introduction of multiple cropping is that the farmer should earn more by taking two or more crops in a year on the same piece of land, than what he earns by taking a single crop and that he should not only be self sufficient but also help the country to become one in production of food crops.

The philosophical basis of multiple cropping according to Melstead (1954) as quoted by Ambika Singh (1960) are:

"Multiple cropping is a philosophy of maximum crop production per acre of land with a minimum of soil deterioration. The philosophy is based on the concept that high production is good on soil, the minimum tillage promotes soil tilth and conserves soil organic matter, that high fertility promotes high yields and lessens the losses of soil humus, that large amount of decomposable organic matter in soil is essential to good tilth and good soil physical conditions and cover in the form of living mulch is good protection against all forms of erosion."

The scope for multiple cropping has been considerably increased during the recent years with the introduction of short duration and high yielding varieties and expansion of irrigation potentialities.

Considering the results of National Demonstration on Multiple Cropping and with the idea of spreading the multiple cropping, the Central Government has started pilot projects on multiple cropping scheme during the IV five year plan. In Karnataka also two such projects were launched during 1972-73, one in Honnali, Shimoga district, a medium rainfall area, and another at Sindhanur, dry tract of Raichur district. This present study deals with the results obtained in respect of multiple cropping demonstrations organised in Nyamathi Circle of Honnali taluk under rainfed conditions.

The data was collected from the farmers on whose field the multiple crop demonstrations were organised by the Deputy Director of Agriculture

(Multiple cropping) Department of Agriculture at Nyamathi Circle. For this the Government of Karnataka supplied the required seeds, fertilizer, etc., on subsidised basis. The type of crop sequences is decided by the Project Officer. The required information is collected by the Field Assistant at Nyamathi Circle by cost accounting method. The study pertains to the year 1972-73 under rainfed conditions of Nyamathicircle. In this area the farmers will get two to three crops in a year in the assured rainfed condition. The first crop is sown during June-July and harvested during the months of September–October. The second crop will be sown during October-November and harvested in January-February.

The data was collected from a total of 15 demonstration plots, with different cropping sequences. Each demonstration plots was of 1 acre size. The results were studied and the following conclusions were reached:

Conclusion :

The highest output of 1,980 kgs. (main product only) was obtained from hybrid jowar - Bengalgram crop sequence. Jowar gave a net income of Rs. 838.20 and the second Bengalgram Rs. 247.70. The yield of Bengalgram is comparatively high and the rates of the market per quintal was also high. The result is high income. (Details are in Table-I).

1.	Hybrid jowar CSH-1 variety in kharif	—
2.	Bengalgram local variety in rabi season	—
3.	No. of cases - 1 year 1972–73	—
4.	Total output obtained from both the crops	1,980.00 kgs.
5.	Gross income obtained	Rs. 1,970.00
6.	Total cost of cultivation	Rs. 884.10
7.	Net income obtained	Rs. 1,085.90

The next important crop sequences are hybrid jowar horsegram, groundnut - tomato and groundnut-wheat, hybrid jowar–horsegram.

1.	Hybrid jowar kharif	
2.	Horsegram - local rabi	
3.	No. of cases 4, year 1972–73	
4.	Total output	1,658.50 kgs.
5.	Gross income	Rs. 1,475.37
6.	Total cost of cultivation	Rs. 796.10
7.	Net income	Rs. 679.27

First crop gave Rs. 593.75 and the second crop gave Rs. 85.70. Since the market value for horsegram is less, the farmer got less income. So it is not a profitable crop sequence. (Details are in table–II).

Groundnut and Tomato :

1 Groundnut Spanish improved kharif

2 Tomato local–Rabi

3 No. of cases–1, year 1972–73

4 Total output obtained .... 1,550.00 kgs

5 Gross income .... Rs. 1,395.00

6 Total cost of cultivation .... Rs. 885.30

7 Net income .... Rs. 509.70

The net income got from the first crop is Rs. 655.50 while from the 2 nd crop though the yield was high due to fall of market price the cultivator incurred a loss of Rs. 145.80. This is not a profitable crop sequence. (Details are in table III).

Therefore it is clear from the above tables that the cultivator should select such crop combinations which gives them the highest net profit depending upon the type of soil, market, labour requirement and other conditons.

References :

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2 Shukla Hazra 'More on multiple cropping' Intensive Agriculture, Vol. X No. 8 October 1972, pp. 8–12.

TABLE-I

Cost of cultivation of crop sequence Hybrid Jowar-Bengalgram

Sl. No.	Items	No. of cases	Total area acres	Cost incurred acres Rs.	Percentage to total	Yield Grain	Yield Straw
			Hybrid Jowar CSH–1				
1	Variable Costs:						
	1) Seeds	1	1.00	18.00	3.20	1,600.00	2,000.00
	2) Manure	1	1.00	90.00	16.01		
	3) Fertiliser	1	1.00	124.00	1.78		
	4) Plant protection chemicals	1	1.00	10.00	1.78		
	5) Labour charges (both human and bullock)	1	1.00	205.00	36.58		
	Total	—	—	447.50	—		
2	Fixed Costs:						
	1) Rent of land	1	1.00	93.75	16.69		
	2) Land Revenue and Taxes	1	1.00	2.00	0.36		
	3) Interest	1	1.00	9.70	1.73		
	4) Depreciation charges	1	1.00	8.85	1.58		
	Total			114.30			
	Total Cost of cultivation	—	—	568.10	100.00		
3	Returns:						
	1) Gross income	—	—	1400.00			
	2) Net income	—	—	838.20			
			Bengalgram				
1	Variable Costs:						
	1) Seeds	1	1.00	18.00	5.58	380.00	
	2) Manure	1	1.00	—	—		
	3) Fertiliser	1	1.00	59.00	18.31		
	4) Plant protection chemicals	1	1.00	—	—		
	5) Labour charges (both human and bullock)	1	1.00	131.00	40.65		
	Total	—	—	208.00	64.54		
2	Fixed Costs:						
	1) Rent of land	1	1.00	93.75	29.09		
	2) Land Revenue and taxes	1	1.00	2.00	0.62		
	3) Interest	1	1.00	9.70	3.00		
	4) Depreciation charges	1	1.00	8.85	2.75		
	Total	—	—	114.30	35.46		
	Total cost of cultivation	—	—	322.30	100.00		
3	Returns:						
	1) Gross income	—	—	570.00			
	2) Net income	—	—	247.70			

TABLE-II

Cost of cultivation of crop sequence Hybrid Jowar-Horsegram

Sl. No.	Items	No. of cases	Total area in acres	Cost incurred for whole area (Rs.)	Cost incurred acre (Rs.)	Percentage to total	Yield Grain	Yield Straw
				Hybrid Jowar CSH–1				
1	Variable costs :							
	1) Seeds	4	4.00	72.00	18.00	3.59	5,250.00	8,900.00
	2) Manures	4	4.00	250.00	62.50	12.45		
	3) Fertiliser	4	4.00	480.00	120.00	23.90		
	4) Plant protection chemicals	4	4.00	28.50	7.13	1.42		
	5) Labour charges (human & bullock)	4	4.00	720.50	180.12	35.88		
	Total	—	—	—	387.75	77.24		
2	Fixed costs :							
	1) Rent of land	4	4.00	375.00	93.75	18.67		
	2) Land Revenue and Taxes	4	4.00	8.00	2.00	0.40		
	3) Interest	4	4.00	38.80	9.70	1.93		
	4) Depreciation charges	4	4.00	35.40	8.85	1.76		
	Total	—	—	—	114.30	22.76		
	Total cost of cultivation	—	—	—	502.05	100.00		
3	Returns :							
	1) Gross income 4,382.50							
	2) Net income 1,095.62							
				Horsegram (local)				
1	Variable costs :							
	1) Seeds	4	4.00	32.00	8.00	2.72	1,384.00	1,350.00
	2) Manures	4	4.00	—	—	—		
	3) Fertilisers	4	4.00	244.00	61.00	20.75		
	4) Plant protection chemicals	4	4.00	—	—	—		
	5) Labour charges human & bullock)	4	4.00	443.00	110.75	37.67		
	Total							
2	Fixed costs :							
	1) Rent of land	4	4.00	375.00	93.75	31.88		
	2) Land Revenue and taxes	4	4.00	8.00	2.00	0.68		
	3) Interest	4	4.00	31.80	9.70	3.30		
	4) Depreciation charges	4	4.00	35.40	8.85	3.00		
	Total							
	Total cost of cultivation	—	—	1176.20	294.05	100.00		
3	Returns :							
	1) Gross income 1,519.00							
	2) Net income 342.80							

TABLE-III

Cost of cultivation of crop sequence Groundnut-Tomato

Sl. No.	Items	No. of cases	Total area in acres	Cost incurred per acre Rs.	Percentage to total	Yield Grain	Yield Straw
			Groundut				
1	Variable Costs :						
	1) Seeds	1	1.00	70.00	15.93	950.00	1,200.00
	2) Manure	1	1.00	30.00	6.83		
	3) Fertiliser	1	1.00	—	14.38		
	4) Plant protection chemicals	1	1.00	—	—		
	5) Labour charges (both human and bullock)	1	1.00	162.00	36.86		
	Total	—	—	325.20	—		
2	Fixed Costs :						
	1) Rent of land	1	1.00	93.75	21.33		
	2) Land Revenue and Taxes	1	1.00	2.00	0.45		
	3) Interest	1	1.00	9.70	2.21		
	4) Depreciation charges	1	1.00	8.85	2,01		
	Total			114.30	—		
	Total Cost of cultivation	1	1.00	439.50	100.00		
3	Returns :						
	1) Gross income 1.095.00						
	2) Net income 655.50						
			Tomato				
1	Variable Costs :						
	1) Seeds	1	1.00	6.00	1.34	600.00	
	2) Manure	1	1.00	60.00	13.46		
	3) Fertiliser	1	1.00	67.00	15.03		
	4) Plant protection chemicals	1	1.00	—	—		
	5) Labour charges (both human and bullock)	1	1.00	198.50	44.53		
	Total	—	—	331:50	74.36		
2	Fixed Costs :						
	1) Rent of land	1	1.00	93.75	21.03		
	2) Land Revenue and taxes	1	1.00	2.00	0.45		
	3) Interest	1	1.00	9.70	2.17		
	4) Depreciation charges	1	1.00	8.85	1.99		
	Total	—	—	114.30	25.64		
	Total cost of cultivation	—	—	445.80	100.00		
3	Returns :						
	1) Gross income 300.00						
	2) Net income 145.80						

2) Choice of companion crop for Sorghum under Dry land conditions of Red Soil type

The problems of traditional dry farming are many. Of these important items that should be considered are a) Utilisation of precarious moisture within the limited period and b) choice of crop varieties. For the utilisation of available moisture the following points should be taken into account.

1 Proper and optimum tillage.

2 Water and soil erosion should be controlled by effective soil conservation methods.

3 The sowing should be taken in time.

4 The excess moisture can be stored by 'Water harvest' techniques.

For the choice of crop varieties:

1 Efficiency of crops in utilising soil moisture will vary crop to crop.

2 Monocot and dicot crop plants remove more of mono and divalentions respectively. (For example. Sorghum removes more of nitrogen ions where as pulse crops remove more of phosphorous and calcium ions.

3 Hence mixed cropping is preferred.

To find out a better choice of companion crop for the dry lands of Red soil type an experiment was conducted during October 1973 to January 1974 in the Agricultural Research Station, Bhavanisagar. For the main crop of Sorghum (M.771) four companion crops i.e. Cowpea, Horsegram, lab-lab and Redgram (local strains) were tested. For every 2, 4 and 6 rows of Sorghum one row of above pulse crop was sown.

The economics of mixed cropping per hectare is given in the table with particulars below:

I Total yield kg/ha.
II Gross income Rs./ha.
III Expenditure Rs./ha.
IV Net income Rs./ha.

TABLE

Ratios	6 : 1				4 : 1				2 : 1			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Sorghum+ Horsegram	198	315	200	+115	160	284	206	+78	201	402	210	+192
Sorghum+ Cowpea	225	418	204	+212	246	442	210	+232	205	560	216	+344
Sorghum+ Lab-Lab	157	245	212	+37	153	268	215	+53	204	348	220	+128
Sorghum+ Redgram	70	900	22	−130	92	128	225	−97	87	137	228	−91

During the crop growth the crop received 280 mm (11") rain only. This rainfall is a limited one. Even in the limited rain the mixed crop of sorghum with cowpea recorded an encouraging net income of Rs. 344/- per hectare in the 2 : 1 ratio. If the rainfall is still more this mixed crop will definitely give more income under dry farming condition. Further the sorghum crop will perform better with the association of cowpea as a companion crops. The cowpea crop spreads in the interspace of sorghum, it acts as cover crop and not only checks the evaporation loss of soil moisture, but also checks the soil erosion also. Thus the fertility status of the land is also maintained.

Source : Farm and Factory, May 1974

3) Effect of Insecticidal sprays on the Pollinators of Sunflower

Sunflower (Helianthus annuus) is totally dependent upon insect pollination for seed set (Free, 1964). Honey bees were the most important pollinators forming 99% of all pollinating insects (Kushmir, 1960), Cirnu (1960) recommended to keep two colonies of bee hive per hectare to get better yield in the U.S.S.R. But application of toxic chemicals during blooming period to control injurious insects is highly hazardous to pollinating bees. So the choice of an insecticide to be used on sunflower crop in bloom should be determined by its hazards to pollinating bees as well as indirectly to the seed set of the crop. With that end in view, observations were made on the effect of certain commonly applied insecticidal sprays on the field visits and mortality of bees as well as seed set of the crop.

Four insecticidal sprays viz., fenthion (Lebaycid) 0.05%, carbaryl (Sevin) 0.1%, endosulfan (Thiodan) 0.07% and parathion (Folidol) 0.05% were given thrice on the 55 th, 65 th and 75 th day after sowing with an appropriate untreated control. The sunflower variety used was EC 68413. Application were made early in the morning (7 a.m.) directly on the flower heads by a hand automizer. Five flowers were marked at random in the plot (7 sq. m.) having a population of 72 plants and frequency of visits of bees was observed one hour and 6 hours after application. Bees collected at one hour, 6 hrs. and 24 hours after spray from the treated plots were kept in clean glass jars, and fed with sugar syrup in controlled condition. Mortality, if any, was

observed at different intervals after spray. At harvest percentage of seed set as well as yield of seeds were recorded.

TABLE-I

Number of visits of bees for one hour on five flower heads.

Treatments	Before spray	1 hr. after spray	6 hrs. after spray
Control	208	204	193
Fenthion	220	4	204
Carbaryl	220	–	202
Endosulfan	146	12	140
Parathion	264	–	240

TABLE-II

Mortality of bees at different periods after insecticidal application.

	Mortality after spray application in per cent		
	After 1 hr	After 6 hrs	After 24 hrs
Control	Nil	Nil	Nil
Fenthion	100.0	58.1	8.3
Carbaryl	100.0	74.7	16.6
Endosulfan	33.2	16.6	Nil
Parathion	100.0	58.1	16.6

It is evident from Table 1 that all insecticidal sprays were noted to reduce the field population of bees immediatly after spray, but repopulated with bees within 6 hours after application. Chemicals like fenthion, carbaryl and and parathion recorded 100 % kill of treated caged bees immediately after spray while endosulfan recorded only 33.2 % kill and appeared to be less toxic (Table II). The mortality of bees caged at 6 hours after spray was found to be less in all variants. After 24 hours of spraying endosulfan recorded nil mortality while fenthion, carbaryl and parathion still retained its toxicity and registered a kill of 8.3, 16.6 and 16.6 % respectively. These results are in accordance with that of Anderson ethal (1968) who earlier reported that severe losses of bees might be expected if fenthion or carbaryl were used when bees were present at treatment time or within a day thereafter. Endosulfan was recorded by him as moderately toxic material which can be used in the vicinity of bees if dosage and time of applications were correct.

TABLE-III

Effect of insecticides on seed set

Treatment	% of filled seeds	% of half filled seeds	% of chaff	% of seed set	Weight (g) of seed
Control	38.65	40,76	20.58	79.41	47.40
Fenthion	51.63	29.52	18.84	81.15	31.60
Carbaryl	40.11	40.11	19.76	80.22	32.40
Endosulfan	39.80	39.57	20.62	79.37	32.10
Parathion	48.58	30.30	21.11	78.88	51.77

No significant difference was evident of the seed set and yield due to different insecticides. The plausible explanation may be that as the decline in visits of bees was observed one hour after spray only in all the treated plots and the plots so treated were repopulated 6 hours after spray application and hence the temporary reduction in visits might not have interfered with the seed set of the crop. It may also be inferred from the result that in a given area, the effect of insecticidal treatment is a long term process. The seed set would have been reduced if continuous applications of insecticides is made over a large area so as to annihilate the entire bee fauna there.

It can be concluded that less toxic chemicals like endosulfan may be used if necessary during evening hours while bee activity is the minimum. If hazardous chemicals like fenthion, carbaryl and parathion are necessarily to be given or used in the neighbouring areas, closing the bee hive temporarily for one day (Anderson et al., 1968) may be adopted since fenthion, carbaryl and parathion recorded mortality more or less 10% 24 hours after spray. 10% mortality of field force was earlier reported by Lieberman et al., (1954) as the maximum tolerance for sanction of a bloom stage application of insecticides.

Source : The Madras Agricultural Journal, June 1974.

5) Crop production strategy in rainfed areas under different weather conditions during 1974-75

The I.C.A.R. has brought out a booklet on the above title which contains recommendations for different rainfed areas of the country. The chapter pertaining to Karnataka State and the one on the "Need for Block level policy and community action for jowar production" are reproduced for the use of the extension workers of the State.

" Steps to be taken for improving productivity in the Dry land Farming areas of Karnataka State :

Karnataka State has nearly six million hectares of land under dry land farming which receives 450–750 mm of rainfall, in general. This farms about 60% of the cultivated area in the State.

The normal or sub-normal activity of the monsoon depends mostly on the onset, withdrawal and the breaks during the monsoon season. The normal onset of the monsoon for the dry farming areas of the State is the first week of June and its complete withdrawal around second fortnight of November. An examination of the monsoon onset and withdrawal for

the past one decade reveals that the early onset and late withdrawal yields normal rainfall conditions without any significant breaks. On the other hand delayed onset and early withdrawal is associated with weak monsoon conditions with prolonged breaks resulting in drought conditions.

There are two predominent regions of dry land farming, viz., black soil areas of the North-eastern part of the State, and red soil areas of the South-eastern part of the State. The steps to be taken for increasing their productivity based on the weather changes are presented below :

Red soil region :

The following are the rainfall patterns in red soil region :

Region I :

The taluks of Bangalore South, Kanakapura, Anekal, Ramanagaram, Channapatna of Bangalore District receive a mean annual rainfall of 837 mm. May, August, September, October receive rains of 10–20 cm. while the rainfall during June–July and November is 5-10 cm. The soils are mostly red loamy and red sand.

Region II :

The taluks of Devanahalli, Dodda-ballapur, Nelamangala, Magadi, Bangalore North of Bangalore dist., Tumkur, Gubbi, Tiptur, Turuvekere and Kunigal of Tumkur district, Chickballapur, Gudibanda and Gowri-bidanur of Kolar district receive a mean annual rainfall of 759 mm. August, September, October receive 10-20 cms. during rest of the months of May - November ; rainfall is 5–10 cms.

Region III :

The taluks of Nagamangala, Maddur, Malavalli, Pandavapura and Mandya of Mandya district, receive a mean annual rainfall of 680 mm. The months of May, September, October receive 10–20 cm. rain and August November months receive 5–10 cm. The soils are mostly red sandy.

Region IV :

The taluks of Hosakote in Bangalore district, Malur, Bangarpet, Mulbagal, Srinivaspur, Chintamani, Bagepalli, Gudibanda, Gowribidanur and Kolar taluks of Kolar district, Madhugiri, Koratagere, Sira, Chikkanayakana-halli, Pavagada taluks of Tumkur district receive a mean annual rainfall of 664 mm. Septemper - October months receive rainfall of 10–20 cm. while in the remaining months of May November the rainfall received is 5–10 cm. The soils are red sandy and laterite in some taluks of Kolar dist., Hosadurga, Holalkere, Chitradurga, Harihar, Davangere, Jaglur and Molkalmuru of Chitradurga district have both red and black soils.

Steps to be taken for increasing productivity are given below :

1. Normal season :

1. For sowing from June 15th to July 15th long duration, high yielding varieties of ragi like ROH.2 may be used.

2. Sow groundnut crop from June 15th onwards but not extend the date

beyond July 15th. If sufficient moisture is available after the harvest of groundnut crop, sow horsegram.

3. Sow hybrid maize by June 30th whenever August, September, October rains are in 10-20 cm range (Regions I and II).

4. In case of good rainfall of about 100 mm in May (Region I) sow cowpea (C.152) by June first week and transplant ROH.2 ragi by August 15th.

5. Practices such as; (a) split application of nitrogen to ragi and maize, (b) application of phosphate at the recommended level based on soil test (c) application of lime to groundnut crops would enhance the yield of crops.

6. Establish suitable grasses on bunds and marginal lands. Forest tree seedlings may be transplanted in waste lands.

7. Use mixed cropping of ragi + pulses (redgram or dolichos) (Regions I and II).

8. In kharif jowar areas (Regions I and III) early sowing (June 15 th) of hybrid jowar need be taken up.

9. Sowing of castor SA-2 or Aruna may be done during June-July in all the marginal lands in Regions III and IV.

10. Sow maize on ridge and furrow layout across the slope. Open a furrow in the centre of crop rows in case of other crops.

11. Entire crop of dolichos may be grown by sowing by July 15 th in which case first one cutting may be for fodder and then leave for grain.

II Normal onset of monsoon by long gaps in rainfall:

1. Seedlings of ragi may be transplanted to fill up the gaps.

2. In case of groundnut, spray urea (1.5%) when drought occurs at 30-60 days after sowing. The spraying may be done after the onset of rains.

3. Apply the second dose of nitrogen for crops like ragi and maize as soon as the rains are received after the drought stage.

4. Timely weeding and creating the soil mulch will be beneficial.

5. Take plant protection measures since pest attack will be severe during drought stage.

6. Give protective irrigation with farm pond water.

7. In case the crop fails resow the field with short duration varieties as suggested for delayed onset of monsoon.

III Delayed onset of monsoon:

1. Sow short duration varieties of ragi, viz., Sharada, Purna, EC. 4840 for sowing upto to August and/or transplant medium duration varieties like ROH-2.

2. Sow crops of cowpea, C.152 or sunflower, soyabean for sowing in late August or September first week.

3. The ragi crop can be sown in anticipation of rains in the second fortnight of August.

4. Interculturing and opening furrows in the rows may be taken to

conserve the late rains in November.

5. Horsegram is the only crop that can be sown when rains get delayed upto September 15th.

IV Early stoppage of rains during the end of the season:

1. Irrigation with farm pond water.

Infrastructure to be built up.

i) Storing of seeds of different crops and varieties to suit the mid season corrections.

ii) Raising cmmunity nurseries of ragi to facilitate transplanting in case of late onset of monsoon.

iii) Raising forest, horticultural crops and grass nurseries to take up planting.

iv) Construction of farm ponds.

v) Establishment of farm machinery and service centres for quick coverage of preparations and sowing of crops in case of abnormal season.

vi) Land shaping, land levelling, contour bunding, control of gullies by grassed water ways will be helpful. Shelter belts may be created.

Mass participation of students in the project areas:

i) Transplanting of ragi when monsoon is delayed.

ii) Spraying of insecticides during drought season especially on pulses.

iii) Planting grasses on bunds and marginal lands. Planting of forest seedlings in waste lands.

Black soil region:

There are 4 rainfall patterns in this zone;

Region I:

All the taluks of Bijapur distrist and Lingasugur of Raichur district. The total annual rainfall is 550 mm. The rainfall is in the range of 5–10 cm. during July, August and October whereas in the range of 10–20 cm. in the month of September. The soils are mostly black in colour with certain patches of mixed red and black soils.

Region II:

The taluks of Raichur, Devadurg and Manvi taluks of Raichur district, Shorapur, Yadagir, Taluks of Gulbarga district. The average total annual rainfall of 670 mm is distributed from June–October. Rainfall during July, August and september is more than in Region I. The soils are mixed red and black.

Region III:

The taluks of Hiriyur and Challakere of Chitradurga district. The average rainfall is 424 mm distributed from May to October. The highest rainfall is during September–October. The soils are mixed red and black and and red loams.

Region IV:

The taluks of Bellary, Siruguppa, Hospet, Mallapur Hadagali, Harapanahalli, Kudligi, Sandur taluks of Bellary district; Sindhanur, Kushtagi, Yelburga, Koppal, Gangavathi taluks of Raichur district; Ron, Nargund, Navalgund, Gadag, Mundargi taluks of Dharwar district and Ramdurg, Gokak of Belgaum district. The mean annual rainfall is 593 mm. rang-

ing from 464 to 780 mm. from May to October. September receives rainfall of 10-20 cm. soils are mixed red and black, red sandy, medium black and deep black.

Following are the steps to bc taken to increase production under the changing weather conditions:

1. Kharif area:

i) Sow groundnut, setaria, hybrid bajra or sunflower by June end in red and medium black soils.

ii) Sow hybrid jowar in region IV by June 15.

iii) Sow castor in marginal lands

iv) Take up bajra+redgram mixture, bajra+Cotton and groundnut+cotton mixed or relay cropping.

2. Rabi Area:

i) Take rabi jowar, safflower or cotton. sunflower can also be grown.

ii) Taken up mixed cropping of rabi jowar+safflower, and double cropping of greengram-blackgram in kharif followed by rabi jowar.

iii) Setaria+cotton may also be taken up.

iv) Advancing the sowing dates with adequate plant protection measures for rabi crops is beneficial.

v) Deep placement of fertilisers 15 days prior to sowing will enhance the yield of rabi crops.

b) Normal onset of monsoon followed by long gaps in rainfall:

1. Kharif area:

i) Cut Bajra for fodder and manage the ratoon either for grain or fodder.

ii) Spray nitrogen (with urea solution) to groundnut crop.

iii) Give protective irrigation to crops from farm ponds.

iv) Timely weeding to conserve moisture and interculturing to create soil mulch and form corrugations.

v) Transplanting bajra to fill up the gaps after the rains start.

vi) Take up plant protection measures.

2. Rabi area:

i) Mulching (soil mulch or organic mulch) will be useful.

c) Delayed onset of monsoon:

a) Normal season:

1. Kharif area:

i) Sow short duration varieties of pulses.

2. Rabi area:

i) When there are no rains in September but good rains in mid October, sow linseed, safflower, wheat and bengalgram in deep black soils.

ii) Late sowing in November–sow linseed, safflower and bengalgram.

d) Early stoppage of rains at the end of the sowing season:

i) Irrigation with farm pond water.

ii) Create thick soil mulch and fill up the cracks by interculturing deep with hoes.

Infrastructure to be built up:

1. Storage of seeds of different crops and varieties.

2. Having community nurseries in bajra.

3. Raising grasses and forest seedling nurseries.

4. To have farm ponds for protective irrigation to crops.

Mass participation of students in the projected area:

1. Planting forest and fruit trees and grasses in bunds and marginal lands.

2. Transplanting bajra or gap filing of differnt crops when rainfall conditions are favourable.

3. Take up plant protection measures during drought period.

4. Protecting farm animals and poultry by mass inoculation wherever veterinary college students are available.

" Need for Block Level Policy and Community action for Jowar Production:

The diffused and unplanned spread of jowar hybrids in parts of Maharashtra and Karnataka resulted in the cultivation of early maturing hybrids like CSH-1 and late maturing locals in close proximity. While the yield superiority of the hybrids in normal and sub-normal years of rainfall has been well established, the process of slow varietal change has accentuated pest problems both for hybrids as well as locals. Hybrid plantings, if delayed, suffered greater losses due to shoofly; the late flowering locals, on the other hand, suffered from midge. The slowness with which varietal transformation was attempted influenced the insect build up to the detriment of hybrids in case of shootfly and midge in the case of locals. This is because midge builds up on the early hybrids anp then attacks the late maturing varieties. The gains made due to yield superiority of hybrids are being off-set due to midge damage on locals in normal years, while in low rainfall years they fail to make grain due to drought. Necessary ingredients for a sound policy towards enhancing and stabilizing dryland jowar production in the country are available from the experience of farmers. What is needed is a rapid varietal spread on area basis rather than unplanned and slow diffusion. How should a block level planning and diffusion take place? The different steps are summarised below.

1. Indentification of maturity zones and provision of varietal diversity with in a maturity zone.

It is known that late locals are vulnerable to drought and midge. The farmers are very much conscious of this and farmer is demands for replacement of late locals are not being met with. The following hybrids and varieties could meet the requirements :

a) Kharif (100–110 day maturing group)
Hybrids : CSH–1, CSH–4, and CSH–5
Varieties : Swarna, 302, 370 and 148.

b) Kharif (110-120 day maturing group)
Hybrids ; CSH-2 and CSH-3.
Varieties : CS 3541, 604 and 329

c) Rabi
Hybrids : CSH-1, CSH-3 and 36 A x148
Varieties : R–16.

2. Spread of hybrids and varieties–An area approach.

It is essential that the distribution of new varieties be on an area basis in preference to diffused spread. Planning for seed should be on a district, taluk or a block basis and the entire seed requirement for the unit be planned, produced and procured well in advance of the sowing season. The cropping strategy should be discussed and finalised by the Gram Panchayat.

3. Off–season seed multiplication of varieties :

With the requisite will and support, it is possible to produce seeds of improved varieties in two off-seasons to cover a 70-80 % of the jowar area, as against the present 5 % coverage. If this initial effort is made and rapid varietal change brought over, the present insect problems could be overcome and the jowar production could be stabilised at least at an average of 2000 kg/ha as against the present 500 kg/ha. This is possible with a mere varietal changeover and with low fertilizer and insecticide inputs, once the initial change is achieved, stabilizing and further building up over and above this would present less difficulties.

4. Components of production.

Emphasis is needed on the following major components of production :

i) Right time of sowing

Kharif :

Sowing within 10 days after the onset of the monsoon during kharif eliminates shoot fly and midge as long as varieties of specified maturity are only planted in a given region. This needs no extra money, but education and effort. If farmers are not able to plant jowar within a specified period, they may be dissuaded from planting jowar and encouraged to sow crops like bajra, setaria, sunflower etc. Such crop and varietal planning should be done by the Village Panchayat with help from the State Department of Agriculture and Agricultural university.

Rabi :

Sowings should be advanced by 20–30 days compared to the traditional dates in the respective rabi areas.

ii) Moderate fertilizer dose

Atleast 30–40 kg N/ha with an equal amount of P_2O_5 applied basally in case of black soils and the nitrogen in two splits during kharif in light soils will return profitable yields.

5. Organizational set up :

An organizational set up specifically charged with the implementation of such a production policy for jowar can achieve results in a period of 2–3 years. An average yield level of 20–25 quintals/ha is in the realm of realization in good as well bad years over the entire jowar area as against the current average of 5 quintals/ha.

CONCLUSION

The planned coverage of entire Blocks with appropriate high yielding hybrids or varieties of jowar provides an unique opportunity for both increasing and stabilising jowar pro–

duction. Through ratooning of early hybrids varieties, the adverse effects of a bad season can be minimised and the beneficial effects of a good season fully exploited. Are we willing to generate the requisite degree of village level planning and endeavour?

Source : *'Excerpts from Crop Production Strategy in Rainfed areas under different weather conditions during 74-75 published by ICAR.'*

VI. Research News

1. Plant protection is a must along with high fertilisers for CSH-1 Jowar :

It is usually presumed that application of recommended level of fertiliser is essential to get high yields of jowar crop. The importance of recommended plant protection schedule is not equally realised. In order to determine the productivity obtainable with varying levels of fertiliser and plant protection, which are normally the constraints operating on the resources of the farmers, experiments were conducted during two kharif seasons of 1972 and 73 under the model Agronomic Experiments Scheme (I. C. A. R.) at Medium Research Station, Siruguppa, Bellary District.

The experiment was conducted with CSH-1 jowar in split-plot design with details of treatments as under.

Main plot treatment-panlt protection levels-3.

I P_1 (UAS schedule).

1) Treated seed from N.S.C.

2) Soil application of Thimet at 40 kg/ha at the time of sowing in the furrow.

3) Spraying with 18 ml Folidol and 40 g of Unizeb in 18 litres of water after 15 days of sowing.

4) Spraying 45 ml of Endrin with 40 g of Zineb in 18 litres of water after 30 days of sowing.

5) Spraying 45 ml Endrin with 40 g of Zineb in 18 litres of water after 45 days of sowing.

6) Spraying Carbaryl 50% W.P. 115 g in 18 litres of water against earheadbug.

II P_2 Minimum schedule.

1) Treated seed from N.S.C.

2) Soil application of Thimet at 40 kg/ha in the furrow at sowing.

3) Spraying Folidol 18 ml, Zineb 40 g and Thiovit 60 g in 18 litres of water, after 45 days of sowing.

III P_3 Control

1. Treated seed from N.S.C.

Sub-plot treatment Fertiliser levels-3

1) F_1–125 kg N, 75 kg P_2O_5 and 37.5 kg K_2O/ha as per UAS recommendation.

2) F_2 - 75 percent of fertilizers given for F_1 i.e., 94 kg. N, 56 kg. P_2O_5 and 28 kg. K_2O/ha.

3) F_3 – 50% of fertilisers given for F_1 i.e., 62.5 kg N, 37.5 kg P_2O_5 and 19 kg K_2O/ha.

There were six replications.

The soil where this experiment was conducted had ph 8.2, E.C. 0.30 m.m hos/cm., organic carbon 0.37%, available P 30 kg P_2O_5/ha and available K 766 kg K_2O/ha.

The observation on growth of crop, incidence of pests and diseases, yield of grain and straw were noted. The average grain yield of two years is presented in table I.

was increased significantly with increase in fertiliser dose from 50 to 100%.

The results have thus indicated that

TABLE–I

Effect of fertilizer and plant protection levels on the average grain yield of CSH–1 Jowar (kg/ha)

Main plot plant protection levels / Sub plot fertilizer levels.	Yield (kg/ha) F_1	F_2	F_3	Mean
P_1	5048.40	4669.79	4245.14	4654.44
P	4862.15	4711.59	3839.58	4471.11
P_3	4088.19	4203.47	3813.89	4035.18
Mean	4666.25	4528.28	3966.20	4386.91

C.D. at 5% between any two plant protection means:	378.42
C.D. at 5% between any two fertiliser means :	210.83
C.D. at 5% between two fertilizer means at the same level of plant protection means.	365.17
C.D. for any two plant protection means at the (i) same level of fertilizer or (ii) different levels of fertilizer.	953.83

On an average of 2 years both plant protection levels produced significant yield differences. While there was no significant difference between F_1 & F_2 and P_1 & P_2, the yield was significantly reduced at F_3 (50% fertilizer dose) and P_3 (no plant protection). The interaction between fertilizer and plant protection was also significant. The reduction in yield due to lack of plant protection measures was significant at the recommended level of fertilizer application. Further, at the recommended level of plant protection the yield

the recommendation of fertilizer dose is closely related to the plant protection that could be adopted by the farmers. While, the recommended fertilizer dose is suitable for a farmer who can adopt the rcommended package of practices for the plant protection, 75% of the dose is adequate for a farmer who can follow only selected plant protection measures.

2 Fertilizers without plant protection measures for high yielding paddies in coastal area will not be profitable:

It is usually presumed that applica-

tion of recommended level of fertilizer is essential to get high yields of paddy crop. The importance of recommended plant protection schedule is not equally realised. In order to determine the productivity obtainable with varying levels of fertilizer and plant protection, which are normally the constraints operating on the resources of the farmers, experiments were conducted during two kharif seasons of 1972 and 73, under the Model Agronomic Experiments Scheme (ICAR) at Medium Research Station, Mangalore, South Kanara District.

Experiments were conducted with Jaya paddy in split plot design with details of treatments as under:

Main plot treatment-Plant protection levels-3:

P_1 Recommended schedule

a) Seed Treatment: – Soak the seed in mercuric compound 1% i. e., Agrosan 18 g. and 1.74 g. $CuSo_4$ dissolved in 18 litres of water for 20 minutes, remove and dry in shade.

b) Nursery spray: On 12th day with 18 ml Parathion 50 % with 18 ml of Hinosan and 0.5 g Copper sulphate in 18 litres of water.

c) Repeat the same spray just a day before planting as in (b).

d) Repeat the same spray to crop at 20–25 th day after planting.

e) Apply Thimet at 12 kg/ha after 15 days of planting and repeat the same on 65 days old crop. Spray 18 ml Hinosan and 0.5 g Copper sulphate on 15th day and 65th day.

f) Spray the crop at flag leaf stage with 18 ml Hinosan in 18 litres of water.

g) Spray the crop again with 18 ml of Hinosan in 18 litres of water, 12 days after flowering.

h) Remove and destroy grasses and weeds which are alternate and collateral hosts for pests, like case worm, leaf roller and some of the diseases.

P_2 Selected Schedule:

a) Seed treatment as in P_1.

b) Spray the nursery at 15 days with 18 ml Parathion+18 ml of Hinosan in 18 litres of water.

c) Dip the foliage in Hinosan solution (18 ml in 18 lts of water) at planting. Select healthy seedling.

d) Apply Thimet at 12 kg/ha at 15 days after plantings.

e) Spray Hinosan 18 ml in 18 lts of water at tillering.

f) Spray Hinosan 18 ml in 18 lts of water on 45th day after planting.

g) Spray Hinosan 18 ml in 18 lts of water at heading stage.

P_3 Control (No control measures for pests or diseases except for seed treatment).

Sub-plot treatments–fertilizer levels-3

F_2-Recommended dose by the University at 100 kg N 75 kg P_2O_5 and 87.5 kg K_2O/ha.

F_2–75% of recommended dose under F_1 i.e., 75 kg N+56 kg P O_5+66 kg K_2O/ha.

F_3–50% of the recommended dose P_2O_5+F_1 i.e., 50 kg of N+37.5 kg of under 44 kg K O/ha.

Apply 50% of N and full dose of P^2O_5 and K_2O at planting and the remaining nitrogen in 2 splits at 4 week and at flag leaf stage.

There were 6 replications.

The soil where this experiment was conducted had pH 5.9 E.C. 20 m. mhos/cm., organic carbon 1.24%, available nitrogen 251 kg/ha, available P 44 kg P_2O_5/ha, available K 161 kg K^2O/ha-

The observation on the growth of crop, incidence of pests and diseases, yield of grain and straw were noted. The average grain yield data of 2 years are presented in table I.

TABLE–I

Effect of fertilizer and plant protection levels on the average grain yield of Jaya paddy (grain yield kg/ha)

Main plot plant protection levels Sub-plot fertliser levels	F_1	F_2	F_3	Mean	C.D.
P_1	5002.29	4718.27	4484.69	4735.08	For any 2 plant
P_2	4500.86	4456.67	4288.27	4415.26	protection means
P_3	3484.45	3390 62	3216.38	3363.81	(P) =141.38.
Mean	4329.20	4188.52	3996.44	4171.38	

C.D. for fertiliser means–110.51 kg/ha.

C.D. for any 2 fertiliser means at the same level of plant protection–191.43.

C.D. for any 2 plant protection at the, i) same level of fertiliser or ii) different levels of fertilisers	801.98 kg/ha

It is observed that the plant protection and fertilizer level both produced on an average significant difference in yields. The differences in yield between recommended (F_1) and 75 per cent recommended fertilizer (F_2) appiication and recommended (P_1) and selected plant protection (P_2) were not of larger magnitude, though statistically significant. However, at no plant protection (P_3), there was drastic reduction in yield, at all levels of fertilizer application. The data clearly indicated that significant increase in yield is obtained with increasing fertilizer dose from 50 to 100 % of the recommended dose, only when the recommended plant protection schedule is adopted. Statistically no significant difference was noticed between recommended fertilizer and plant protection (P_1F_1) and 50 % fertilizer and selected plant protection (P_2F_3).

It can be concluded that if the resources of the farmer are limited, selected plant protection with 50 % recommended fertilizer dose is satisfactory. For the farmers with ade-

quate capital, following the recommended fertilizer dose and plant protection schedule may be profitable. The data also indicate that application of fertilizer beyond 50 % recommended level is not remunerative for the farmers who do not adopt the plant protection measures. Thus the recommendation of fertilizer level needs to be closely related to the adoption of plant protection measures, in the coastal tract of Karnataka.

3. Dipping of paddy seedlings in Carbofuran suspension reduces the dead-incidence :

Control of pests during the seedling establishment stage is very essential and generally no attention is paid to control the pests during this stage of the crop. The primary objective of this study was to evaluate the effectiveness of some of the systemic insecticides when used as seedling dips in controlling the rice pests during the seedling establishment stage.

The study was conducted during the summer season 1973–74 on Jaya variety. The roots were washed after pulling out the seedlings, placed vertically in a plastic container and the insecticidal suspensions were poured into the containers to cover only upto the root zone. After 12 hours the seedlings were transplanted to the experimental plots.

The plot size was 3 x 2 meters and and there were three replications. Four weeks after planting the observations were recorded. The insecticides used, their concentration and the insect counts are given in Table I.

TABLE–I

Mean insect counts and plant height in seedling dip experiment plots 4 weeks after transplanting.

Sl. No.	Insecticide	Concentration	Dead hearts/100 hills	Leaf hoppers/sweep	Plant height in cm.
1.	Cytrolane 5g	0.020	41.3	3.0	17.21
2.	Phosphamidon 100 EC	0.020	26.6	3.6	19.17
3.	Carbofuran 50 WP	0.025	27.6	3.0	17.43
4.	-do-	0.050	24.3	4.0	19.81
5.	-do-	0.100	19.3	1.2	21.19
6.	Phorate 10 g	0.020	45.0	4.3	17.09
7.	Water-check	–	37.0	3.0	18.06
		SEM	NS	+/−1.04	+/−0.97
		CD at 5%	–	2.02	4.10

During the period of observation incidence of two common pests, the stem borer and leaf hoppers were noticed. Analysis of the data revealed that there was no significant difference. The population of leaf hoppers and plant height was significantly different in plots planted with seedlings dipped in carbofuran 0.10 % suspension.

Lilly and his co-workers have emphasized the potential value of Carbofuran seed dressing on rice for protection against leaf hopper damage in nursery beds. Indications in the present study are that, dipping paddy seedlings in Carbofuran 50 wp (0.10%) suspension reduces the dead-heart incidence, leaf hopper population and increases the plant vigour. Further confirmation of the results were suggestive that this method could be used for protecting rice crop against the insect pests at the seedling establishment stage.

Source : Current Research, University of Agricultural Sciences, Bangalore, July 15, 1974.

VII News in brief

1 Taking Cowpea in early kharif is a profitable practice in Bangalore and adjoining areas :

Cowpea as a rainfed crop in the months of May-July has been found to be quite profitable in certain parts of the State.

Nearly 400 acres in Bangalore and adjoining areas were under this experiment during the current early kharif season. Sowing was done as soon as the showers were received in the month of May, using a seed rate of 8 kgs per acre. 120 kg of superphosphate per acre was recommended to be applied to the soil before sowing. Where the seed was treated with rhizobium culture, the N level used was to be 5 kg. Otherwise about 10 kgs of N was recommended to be used. The variety used was C-152. One interculture was done to keep the weeds under control.

The crop faced a long drought spell of over one month. Inspite of this, it was expected that the crop would yield about two and a half qtls./acre. Wherever moisture was good, the yield was expected to be better. The first picking was to be at two and a half months after sowing and the 2nd and final 15 days after this.

At current market rate, an yield of two and a half qtls. works out to be quite a profitable propositon. Also, being a pulse crop, it enriches the soil to a great extent. Another advantage is that at the time of first picking Ragi can be transplanted in the standing crop of Cowpea. A top dressing of 10 kg of nitrogen may be given. If this practice is followed, farmers can take 2 crops between May to November and they can get a gross income of about Rs. 1300/- per acre.

At present, farmers of Bangalore and adjoining areas, don't take any crop in the early kharif months. They wait till middle of July for taking up sowing of the normal kharif crop. The above experiment even in an unfavourable season like the current season would show that in all these areas of red loam and heavier soils where showers are received towards end of April or in the beginning of May, farmers can advantageously take a cow-pea crop and follow it up with the regular ragi crop. Dr. Havanigi of the University of Agricultural Sciences says that this will help in taking two crops within a period of 7 months and bring a gross income of Rs. 1,300/- per acre, as against a mere Rs. 700/- at present. Besides, being a pulse crop, the soil will be enriched.

2 Flood damage in South Kanara district :

The district of South Kanara was

reeling under unprecedented floods in the last week of July owing to incessant rains, amounting to a near cloud burst, received on 23, 24 and 25th of the month. The flood fury has caused enormous damage to men and material alike. Hundreds of farmers have lost their homes. Large areas of standing paddy crops were submerged by the flood waters for 5 to 7 days continuously. In all these affected areas the early planted first crop was nearly lost.

The total paddy area damaged in the district has been estimated at 17,000 acres. Out of this about 4700 acres are in Mangalore taluk consisting of 56 villages, 2000 acres in Udipi taluk in 26 villages, 1000 acres in Kundapura taluk in 38 villages, 800 acres in Karkala taluk affecting 30 villages, 6000 acres in Bantwal taluk in 36 villages, 530 acres in Sullia in 23 villages, 400 acres each in Belthangady and Puttur taluks affecting 38 and 37 villages respectively. In addition, about 350 acres of sugarcane and 38 acres of coconut gardens have also been severely damaged, and a total of 106 acres of paddy land have been heavily silted up.

On a further survey after the floods have receded, it is estimated that out of the total area of 17,000 acres affected, the area severely affected is about 4,000 acres and the area that actually requires resowing is about 2,500 acres. The areas severely affected are the ones that come under early planted paddy. Since this is mostly a one crop area, farmers in these areas have been advised to plant short duration paddy variety "Annapurna" as it is too late for any other variety. In areas where a second crop is generally taken, farmers have been advised to abandon the idea of taking a first crop anymore but to synchronise the 2nd crop with the normal planting season for the 2nd crop and use high yielding varieties to make up for the loss of the 1st crop.

Special arrangements have been made by the department to arrange seeds and fertilisers to the affected areas.

The Hon'ble Agricultural Minister in his radio talk over the All India Radio on 18th August, 1974, has appealed to the various organisations concerned to help alleviate the sufferings of the affected people.

VIII DEPARTMENTAL NEWS

a) Director's tour

The Director of Agriculture accompanied the Hon'ble Minister for Agriculture to Holavanahalli on 2–7–74 and participated in the field day organised jointly by the University of Agricultural Sciences, Agriculture Department and Mangala Farm Service of M.C.F. Ltd. On 3-7-74 he was in Chitradurga where he inspected the Soil Conservation Training Centre. He proceeded to Davanagere on 4-7-74 to inspect the land reclamation and drainage works, where he also held discussions with local members of the legislature, Departmental Officers and Specialists of the University of Agricultural Sciences, about acquiring of lands for opening a demonstration farm in Bhadra project area. He was in Mysore on 6-7-74 to attend the First Asian Symposium on Regional Planning and National Development. He went to Hoskote on 13–7–74 and inspected the paddy demonstration plots. He presided over the seminar on Farm Broadcasting at the Rural College, Kanakapura on 14-7-74 organised by All India Radio, Bangalore. He went to Kolar on 20–7–74 to inspect the Soil Testing Laboratory where he also reviewed the agricultural development programmes of the district. He accompanied the Hon'ble Minister for Finance to Hassan and Mysore districts on 22-7-74 and 23-7-74 respectively and inspected the scarcity affected areas. He was in Karnal on 27–7–74 to attend the Selection Committee Meeting of National Dairy Research Institute.

b) Schemes: Nil

c) Promotions and transfers:

The following senior class I and junior class I officers were transferred:

Sl. No.	Name and designation of the officer	Where posted
	Sriyuths:	
1.	B. K. Gai, Deputy Director of Agriculture, (Principal) R.D.T.C. Dharwar.	Deputy Director of Agriculture, South Kanara, Mangalore.
2.	R. S. Angadi, Deputy Director of Agriculture, (Under orders of transfer as Deputy Director Agriculture, South Kanara).	Deputy Director of Agriculture, (Principal) RDTC, Dharwar vice Shri B. K. Gai,

3. G. K. Badigar, (Under orders of postings as Deputy Director of Agri. IDLAD Hadgali).	Deputy Director of Agriculture (S.C.) Bellary.
4. G. B. Kavalur, (Under orders of transfer as Deputy Director of Agriculture (SC), Kolar).	Deputy Director of Agriculture, (S.C.) Shimoga vice Shri Satyappanavar.
5. H. Murigappa, Under order of postings as Assistant Director of Agriculture, Hospet.	Assistant Director of Agriculture, (Training) F.T.E.C., Kudige vice Shri A. B. Hullikavi.
6. A. M. Kalmath, Under orders of postings as Assistant Director of Agricuture, Sirsi.	Assistant Director of Agriculture, (Soil Con.), IDLAD, Hadagali vice Sri P. A. Patil, transferred.
7. P. A. Patil, Assistant Director of Agriculture, (Soil Conservation), IDLAD, Hadagali.	Assistant Director of Agriculture, (Radio Contact), F.T.E.C., Bhadravati vice Shri D. M. Hongalmath.
8. D. M. Hongalmath, Under orders of postings as Assistant Director of Agriculture (R.C) Farmers Trg. & Edn. Centre, Bhadravati.	Retained as Assistant Director of Agriculture, Sirsi.
9. B. K. Karibasappa, Under orders of postings as Assistant Director of Agriculture, Bhadravati.	Retained as Assistant Director of Agriculture, Hospet.

Publications, Extension materials and Radio talks:

Fortnightly seasonal tips for the benefit of the farmers in the State for the month of August were prepared in consultation with the specialists of the Directorate and sent to the Dept. of Information and Publicity and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this news of agricultural importance were collected and sent to All India Radio, to be broadcast in the evening programme 'Krishi Ranga'.

New additions to the Library :

About 61 new books have been added to the Departmental Library recently. The details are as follows :

	Title	*Author*
1	Tropical crops	Purseglove J.W.
2	Soils of India	Published by FAI
3	Rice	,,
4	Fertiliser hand book	,,
5	Introduction to physiology of cereal crops	Shivaraj A.
6	India and China : Studies comparative in development	Chen (KI) and Uppal JS
7	Economic Nematology	Webster J.M.
8	Chemistry and technology of tobacco and tobacco smoke	Schmetltz
9	Agricultural policy in India	Karla
10	Green Revolution	Randhwa M.S.
11	Agril. development in developing countries	Published by Indian Society of Agril. Economics
12	Modern India's economy	Malenbaum
13	Centre State relation in Agricultural Development	Published by F.A.O.
14	Harmful effects of pesticides	Wadhwani A.M.
15	Social change in India	Kuppuswamy B.
16	Hand book of vertebrate pest control	Lokeshwar R. R.
17	X–Ray analysis of seeds	Banerjee S. K.
18	Review on soil water relationship of Indian soils.	Gupta B. R.
19	Fertilisers and their use	Published by F.A.O.
20	Pesticide chemistry Vol-1	Tahori A.S.
21	,, Vol-2	,,
22	,, Vol-3	,,
23	,, Vol-4	,,
24	Agril. Atlas of India	Jasbirsingh
25	Green Revolution in India	,,
26	Viability of seeds	Roberts E. H.
27	Fungi in Agril. soils.	Domsch K. H. and Gams W.
28	Text book of plant virus dieseases	Smith K.M.
29	Soil Micro–Oraganisms	Gray and Williams
30	Systematic fungicides	Marsh R. W.
31	Problems of farm Mechanisation	Published by Indian Society of Agricultural Economics.
32	Some aspects of long term Co–op. Agril. Finance	Published by Agro–Economic Research Centre
33	Evaluation of land reforms Vol–1	Dantwala M.A. & Shah C.H.
34	Conditions of stablility and growth in arid agriculture	Jodha N.S. and Vyas

35	Residue review Vol-46	Gunther F.A.
36	,, Vol-47	,,
37	Microbial life in the soil	Hattori T.
38	Cotton: With special reference to Africa.	Prentice A.N.
39	Plant growth substance in Agriculture	Weaver R. J.
40	Soil organic matter its role in crop production	Ailison F.E.
41	Vegetable fibres	Kirby R. H.
42	Sugarcane Physiology	Alexander A.J.
43	Chemistry of organo-phosphorus pesticides	Schmidt K.J. & Fest C.
44	Rapseed	Appelquist L.A. & Olhson R.
45	Encyclopaedia of plants Vol-1& 2	London J.C.
46	Production and utilisation of quality cotton	Elliot C.
47	Grassland improvement	Semple A.T.
48	Farm implements from arid and tropical regions	Hofen H.J.
49	Plant Pathologist Pocket Book	Published by CIBA
50	Manual of weed control	Joshi N. C.
51	Residue review Vol-48	Gunther F.A.
52	Agril. Planning in developing countries	Jain S.C.
53	Fundamental Principles: Agril. Chemistry	Sankaran A.
54	India's development experience	Singh
55	Bee Keeping in India	Premnath
56	Economic growth structure	Kuznets
57	Indian Tea	Manmohan S
58	Statesman year book	Paxton J.
59	Principles and practice of Agril. Research	Salmon S.C. & Hanson
60	Coffee	Wellman F. L.
61	Castor, Sesame and Safflower	Weiss E. A.

On the farm front

Volume-8 October 1974 No. 10

FARM ADVISORY AND EXTENSION SERVICES

KARNATAKA STATE
DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

Cover :

Failure of kharif rains over wide regions of the country is feared to result in steep fall in the production of oilseed, especially of groundnut. This bring into sharp focus the need to take up alternate steps to make good the loss. The I. C. A. R. has suggested extensive cultivation of sunflower throughout the country.

The strength of a technical department like ours depends upon the professional competence it possesses at different levels, the effectiveness with which it applies that knowledge in the service of farmers and the willingness and enthusiasm with which it does so. No doubt, we have been making a significant contribution to the technological development in this State. But, compared to our potential, our performance is rather low.

During my tours, I have been particularly concentrating upon the middle level and the ground level functionaries of our organisation. Most often, I find that the technical knowledge of our colleagues is not up to the mark. Besides, their ability to transmit the know-how is also minimal. Their planning effort to utilize the technical knowledge in their respective jurisdictions, also leaves a lot to be desired.

My impression is strengthened at every step, that the very first thing, we have to do in the Department is to build up our technical competence at different levels. I would put the responsibility of upgrading technical abilities of the ground level and middle level staff on the shoulders of the Joint Directors and the Deputy Directors of Agriculture. I am convinced that, whatever may be their other problems, there is no serious impediment for the Senior Officers to keep their staff up–to–date in technical knowledge.

How should we go about tackling this problem in short term? My discussion with the Field Officers leads me at least to three important activities which we can develop, immediately.

1. Monthly Technical Meetings :

The Deputy Director of Agriculture is the Chief Executive of the Agricultural Development Programmes. Some times there may be more than one Deputy Director in a district incharge of Soil Conservation, Special Programmes and Training Centres. In such a situation the regular Deputy Director of the district should act as convener of this group. Every month there should be a meeting of the professionals in the district, at least for one half day completely. In these meetings nothing other than the professional topics should be discussed. There are many ways in which such deliberations of a technical nature can be developed. For instance, seminars on better cropping patterns for the district may be organised or a simple discussion on the problematic issues may be raised or a visiting professional may be invited to address the group. It is upto the district team to devise

various ways in which the most important agricultural topics are brought into the discussion in these meetings for the purpose of improving the technical knowledge of the members. The originality, initiative and perseverance of the Deputy Directors of Agriculture alone can get results. The Joint Directors of Agriculture, on their part, have the responsibility for creating a suitable atmosphere, providing necessary opportunities and ensuring results.

2. Issuing Monthly Technical Bulletin :

In addition to the monthly meeting, another activity that needs to be developed and organised at the district is issuing technical bulletin, every month. Such bulletins should include technical information originating from external sources as well as the appraisals of the programmes in the district. It should also reflect the findings, analyses and interpretation related to problems and opportunities in the district by the Subject Matter Specialists. This is essentially an instrument for the Subject Matter Specialists to keep themselves up-to-date, on one hand, and to disseminate what they know to their colleagues on the other. The quality of the technical bulletin will also reflect the technical depth and scholarship of the Subject Matter Specialist and other professionals in the district. The regularity with which such bulletins are brought out will also speak of the efficiency and dedication of the group involved.

Once again the Joint Directors have to provide the much needed leadership in this regard. The success and standard of such activities will indicate how much he is interested in the professional activities in his jurisdiction.

3. Periodical Professional Tests :

Gramsevaks and Agricultural Extension Officers are the two catagories of personnel who are in direct touch with the farmers. Ultimately, it is their technical knowledge which will get transmitted to the farmers on a large scale. Therefore it is absolutely essential that the senior and the middle level officers spare no efforts in keeping the Gramsevaks and the Agricultural Extension Officers up to date. But, my observation so far has not been encouraging. For tackling this problem, some officers have suggested conducting periodical tests as a measure of ensuring the technical competency of the ground level staff. I agree with them. It is an important means available to us.

The Deputy Directors of Agriculture and the Subject Matter Specialists should conduct appropriate technical tests for the

Gramsevaks and the Agricultural Extension Officers at the beginning of every season to ensure that they know what they should know. The gaps in their knowledge should form the basis of our seasonal training programmes. After the training also, these tests will be helpful for understanding how far the training has been effective.

The tests should not stop with the Gramsevaks and the Agricultural Extension Officers alone. Such tests should also be conducted for the Assistant Directors of Agriculture and the Subject Matter Specialists up to the district level. This is quite essential. Taking these tests should not be considered either as below dignity or lack of confidence. Such tests have a relevance at this stage of our development. The Joint Directors of Agriculture once again have a responsibility here. They should devote adequate attention for this purpose.

In conclusion, I should say that the organisational units kept at the divisional and the district levels are not sharp and effective enough. The responsibility should be accepted by the Joint Directors and Deputy Directors. This, however, should not be taken as a reflection on the past but as a responsibility to be discharged in the future.

R. Dwarakinath
Director of Agriculture

The month in retrospect

(Seasonal and crop conditions during August 1974)

Rains failed in many districts of the State. This long spell of dry weather had affected standing kharif crops. In many districts sowing was held up for want of sufficient moisture in the soil. Sowing of cotton, both commercial and seed, sunflower, ragi and hybrid maize were under progress in some of the districts. The agricultural situation in brief is given below for each division.

Bangalore division :

Dry weather prevailed in the districts of Bangalore, Kolar and Tumkur whereas light showers were received in Chitradurga district and fairly good showers in Shimoga district. Standing kharif crops were withering for want of rains. If good rains were not received immediately the prospects of kharif harvest were gloomy. Transplanting of ragi, paddy, sowing of ragi, navane, horsegram, sunflower, hybrid cotton were under progress in the districts where sufficient moisture was available in the soil. Weeding and interculturing operations in groundnut and ragi plots and preparatory cultivation operations for sowing of rabi crops were some of the major agricultural operations carried out. Stemborer, aphids, jassids, mites on cotton, leaf miner and tikka on groundnut and stemborer on sugarcane were noticed against which necessary plant protection measures were taken up.

Mysore division :

Dry spell prevailed in Mysore, Mandya and in parts of Hassan districts. Moderate showers were received in Chikmagalur, Coorg and South Kanara districts. Rains were badly needed for the late sown kharif crops in parts of Mysore and Mandya districts. Important agricultural operations carried out were transplanting of ragi and paddy, sowing of sunflower, hybrid maize, planting of sugarcane, preparatory tillage operations for sowing of rabi crops, harvesting of potato, early sown hybrid jowar, groundnut, early sown hybrid maize, kar ragi, and plant protection measures on standing crops. Earhead pests on hybrid jowar, stemborer, thrips, leaf roller on paddy, tikka and leaf miner, on groundnut were noticed. Necessary control measures were taken up to control the further spread of pest and disease attack.

Belgaum division :

Fairly good showers were received in Bijapur district which was helpful for kharif crops. But in parts of Belgaum, dry weather prevailed and this was causing anxiety. The standing kharif crops have started withering in many parts of the district. Sowing of sunflower, cotton, transplanting of tobacco, top dressing

of sugarcane, and intercultural operations in standing kharif crops were some of the agricultural operations carried out. Grass hopper on paddy, stemborer on jowar, aphids on groundnut, blight on potato was observed against which necessary plant protection measures were taken up.

Dharwar division :

There was a long spell of dry weather in many parts of Dharwar. Normal rains were received in North Kanara district. The standing kharif crops have started withering in many taluks of Dharwar district. Sowing of hybrid cotton, harvesting of pulses and ground nut, weeding, interculturing and top dressing of paddy were carried out. Blast and stemborer on paddy, earhead pests on hybrid jowar, cutworms on cotton were noticed. Necessary plant protection measures were taken up.

Raichur division :

Dry weather prevailed in Raichur and Bellary districts. Kharif crops in many taluks have been adversely affected by the long spell of drought. Sowing of hybrid cotton, harvesting of groundnut, transplanting of paddy, preparatory cultivation operations for sowing of rabi crops were carried out. Earhead pests on kharif jowar, leaf miner on groundnut, aphids, thrips and mites on cotton were noticed for which necessary control measures were taken up.

Gulbarga division :

There was a long spell of drought in both the districts of Gulbarga and Bidar. Standing kharif crops have started withering. If good showers were not received immediately, the prospects of kharif production were gloomy. Harvesting of groundnut, greengram and coriander, preparatory tillage operations for sowing of rabi crops were carried out. There was a minor incidence of thrips, aphids and leaf spot on cotton in patches. Necessary plant protection measures were taken up.

Food Production Prospects in Karnataka during 1974–75

The prospects of food production in Karnataka have brightened greatly following widespread showers received in the month of September.

Although the kharif season started well with the receipt of showers in early May, enabling taking up sowing operations in the early sown rainfed tracts of Mysore and Hassan, a long spell of drought followed and this virtually damaged the standing crops of jowar and early ragi.

The sowings of mid-late rainfed kharif crops of ragi and jowar over wide areas in the southern districts of Shimoga, Chitradurga. Bellary, Chickmagalur, Mandya and Hassan were not satisfactory on account of the erratic nature of the rainfall received during June and July.

Similarly, in the late kharif sown tracts of Bangalore, Tumkur, Mandya and Kolar, the sowing of Ragi, which is the main rainfed crop, was delayed by about a fortnight to a month over the entire region.

The position in the kharif tracts of northern Karnataka was however satisfactory although even there, showers were badly needed for the standing crops, which was further affected by the fact of widespread

rat menace in Gulbarga and Bidar. In the coastal districts of South Kanara and North Kanara where the main crop is paddy, the operations were badly delayed on account of the delay in the setting in of the monsoon. However, the showers received during July were adequate and this enabled planting of paddy over the entire area though a little delayed.

In the malnad tracts of Coorg, Chickmagalur, Hassan and Shimoga, paddy, which is the main crop, was planted late.

have dramatically brightened. But in any case, there is bound to be short fall owing to various factors like delayed monsoon, high cost of fertilizers, poor showing under High Yielding Varieties Programme etc.

Effect on yielding varieties programme :

The main victim of delayed and unsatisfactory monsoons was the high yielding variety programme. The kharif targets under the different high yielding varieties were as follows :

	Target (in hects.)	Achievement (in hects.)
1. H. Jowar	4,00,000	3,30,000
2. H. Maize	1,00,000	83,000
3. Paddy	3,00,000	1,95,000 (some area is likely to be covered during Sept.)
4. H. Bajra	80,000	73,000

The tanks in the transition areas of Hassan did not receive sufficient water and therefore, paddy planting had to be abandoned.

Thus the situation obtaining at the end of August, over the entire Southern Karnataka was rather alarming. Nearly 50,000 tons out of the early kharif crops were feared to have been lost while the prospects of mid-late and late kharif crops was also causing great anxiety. However, nearly the entire area under paddy had been planted except under some rainfed tanks.

Good showers in September :

Following good showers in September the prospects of kharif production

The area under hybrid jowar was down by 70,000 hects. and even what was sown was feared to yield a poor harvest. Similarly, high yieding paddy area is down by more than 1 lakh hect. and hybrid maize by about 15,000 hects. whereas in the case of H. Bajra target has been nearly achieved.

Kharif production target :

The total kharif production target was of the order of 49.18 lakh tonnes. In view of delayed and erratic nature of the rains and in view of the reasons stated already, the total shortfall is expected to be of the order of 6 lakh tonnes.

Rabi and Summer Programmes :

The prospects of taking a normal rabi and summer programme have greatly brightened following the rece-

nt showers. In fact, it would be nearly possible to make good the loss in kharif production as availability of water in the major and medium irrigation projects and also in the major and medium tanks all over the State, is at this stage considered to be very encouraging. The following revised targets under high yielding varieties and summer programme have been set for rabi seasons and the entire target seems to be within the realms of achievements:

the current year will be almost equal to that of the previous year.

Sizeable area under high yielding varieties will be brought under the new projects viz., Kabini, Hemavati which will add up to the overall effort during Rabi and Summer and thus substantially reduce the gap.

Position as compared to the requirement :

Keeping the hopes as above, the

	Rabi	Summer (Hectares)	Total
1. Jowar	3,000	38,000	41,000
2. Wheat	64,000	–	64,000
3. Maize	19,750	25,050	44,800
4. Paddy	38,000	68,000	1,06,000
5. H. Bajra	–	16,000	16,000
Total	1,24,750	1,47,050	2,71,800

The total original target of food production for rabi and summer is of the order of 15 lakh tonnes and this has now been raised to 18 lakh tonnes with a view to making good the shortfall in kharif production.

Thus, the expected overall performance for the whole year, as against the target of 64 lakh tonnes, will be of the order of 61 lakh tonnes, leaving a marginal shortfall of 3.0 lakh tonnes. Thus the expected production during

State would be self sufficient in cereal grains during 74–75 season. The shortage in pulses which is of the order 50% of our requirement is likely to persist. The production of Oilseeds, especially that of Groundnut crop, is likely to show considerable shortage ranging from 20 to 25%. Special efforts are being made to step up production during Rabi and Summer. Production of Sugarcane which is of the order of 90 lakh tonnes is likely to be kept up.

III INPUTS FOR FARMERS

Fertilisers :

In view of the increased allotment made by the Government of India to the State for Rabi 1974, Government have reviewed the supply position of fertilisers and liberalised doses for different crops in G.O. No. AF. 70. AFT. 72 dated 7.8.74 and it has further enhanced in G.O. of even No. dated 21-8-74. As per this policy all high yielding varieties of crops, seed production plots, demonstration programmes, tuber crops like Potato, Sweet potato, Tobacco, Vegetables, Sunflower, Sea Island Cotton, Mulberry, V.F.C. Tobacco, receive the full dose of fertilisers as recommended by the

departments for rabi season. Likewise sugarcane in factory zones would receive 100 kg./hectare during rabi season in addition to 60 kg. supplied during kharif season. This relaxation has been made by the Government with a view to seeing that the food production in particular and agricultural production in general does not suffer on account of the shortage of fertilisers.

All the officers are aware that the fertilisers are to be distributed to farmers on cards. As against 24 lakh cards supplied to the districts, 16 lakh cards have been distributed representing 65% progress. 35% of the farmers are yet to receive the cards. Representations are being received both by the Government and the department that many farmers have not received the supply of fertilisers against cards. All the Deputy Directors of Agriculture are requested to take up a drive in each district for a fortnight and see that farmers who have not obtained cards are supplied. Likewise in respect of farmers who have received the cards, during kharif season, entries about the supply at the revised doses may be made immediately.

Very many complaints of malpractices by dealers and farmers like adulteration, spurious and substandard materials, black marketing and smuggling outside the State, etc. have been received. In the present context of shortages these malpractices will take place on a large scale. It is the duty of Departmental Officers to intensify their vigilance over these nefarious activities so that these evils are minimised, if not completely eliminated. The public looks to the department for vigorous efforts to put down these malpractices with all the powers at our disposal. The departmental officers are requested to do their best in this regard.

IV ARTICLES CONTRIBUTED BY THE DEPARTMENTAL OFFICERS

1) Economics of IET 1991 (Sona) cultivation in Kolar district

K. Muralidhara Rao, A.A.O., (Farm Management) Hebbal, Bangalore

The IET 1991, a high yielding variety of rice, is dwarf, photo-insensitive, and was developed from the varieties GEB 24 x Taichung Native-1. Due to its attractive appearence and good cooking quality and high yielding potential equal to that of Jaya, it has become very popular among the rice cultivators of our State. This was until recently being popularised through Minikit programme. The variety matures in about 140-145 days with other outstanding merits like its length breadth ratio, amylose content, volume expansion, grain elongation, hulling and milling characteristics. The economics of its cultivation were studied and the out come of a case study made in selected villages of Kolar district are presented in this paper.

The sample and method of study:

The data required for the purpose of study was collected by Field Assistants of the Farm Management Scheme, from the cultivators belonging to the selected villages of Kolar district. Prior to data collection a proforma was designed and used for the purpose. In all only 8 cultivators who had grown IET-1991 during kharif 1973 in sample villages were selected. The overall total area under this variety was 7.30 acres. Information on various inputs used and outputs obtained was collected from them separately and finally such data was combined together and average quantity of input and output over an acre was worked out to facilitate the assessment of the cost of cultivation per acre. The analysis of data is as follows.

Input-output relationship:

The extent of output ultimately obtained in any enterprise mainly depends upon the different inputs used according to the capacity besides the influence of other factors. In the current case study sample cultivators had used paddy seeds at the rate of 28.50 kg. over an acre which is slightly higher than the recommended seed rate. Application of farm manure was undertaken over the entire area and a sizeable amount of 4,685 kg. farm-yard manure was spread on an acre which is more than double the quantity recommended in order to make up the lower level of N.P.K, supplied through fertilisers which is scarce. The level of application was 32.16 kg. nitrogen, 12.40 kg. phosphoric acid and 10.31 kg. potash as against the recommended dose of

TABLE-1

Input-output relationship in the cultivation of IET-1991

Sl. No.	Items	Per acre
1	INPUTS :	
	a) Variable inputs	
	1. Seeds (kg)	28.50
	2. Farm yard manure (kg)	4,685.00
	3. Chemical fertilisers (kg)	
	i) Nitrogen	32.16
	ii) Phospharic acid	12.40
	iii) Potash	10.31
	4. Plant chemicals chemicals	
	i) Endrin (ml)	740.00
	ii) Malathion (ml)	103.00
	iii) Zineb (gm)	41.00
	b) Labour inputs	
	1. Human Labour (Mandays)	90.61
	i) Men (Mandays)	53.28
	ii) Women (Womendays)	56.36
	2. Bullock labour (Bullockdays)	19.59
2	OUTPUT :	
	1. Grain (kg)	1857.53
	4. Straw (kg)	2,300.00

TABLE-2

Cost-benefit relationship in the cultivation of IET-1991

Sl. No.	Items	Per acre Rs. P.	Percent to total cost	Cost per 100 kg. of grain
1	Costs :			
	a) Variable costs	369.73	48.73	19.90
	1. Seeds	48.01	6.33	2.58
	2. Farm yard manure	100.00	13.18	5.38
	3. Plant protection chemicals	22.30	2.94	1.20
	4. Fertilisers	143.42	18.90	7.72
	5. Irrigation charges	56.00	7.38	3.02
	b) Labour costs	389.05	51.27	20.94
	1. Human labour	256.20	33.76	13.79
	2. Bullock labour	132.85	17.51	7.15
	Total cost	758.78	100.00	40.84
2	Returns :			
	1) Gross income	2251.15		
	2) Net income	1492.37		

Note : Indirect costs viz., rent and rental value, land revenue etc., are excluded.

40:20:20 per acre. Thus, as compared to the expected yield of 25-28 quintals per acre, there is reduction in the yield which could have been made good had the cultivator practiced the growing and incorporating green manuring crop with phosphatic fertilizer. Certain plant protection chemicals like Endrin, Malathion and Zineb were used to check the prevalence of pest and diseases. 740 ml. of Endrin 103 ml. of Malathion and a low amount of 41 gm. of Zineb was being sprayed to crop of an acre. As regards utilizatión of labour input, slightly more women labour were employed than men labour in cultivating the crop. On an average, 53.28 men labour and 56.36 women labour or 37.33 mandays had worked on the farm per acre. In other words 90.61 mandays of human labour had been utilised to raise the crop. Nearly 20 days bullock labour was employed. Input-output relationship has been summarised in Table-1.

The average yield of grain harvested was 1,857.53 kg with its corresponding straw of 2,300 kg per acre.

Cost benefit relationship :

Generally, the cost of cultivation of crops are computed from the costs incurred on different items of cost viz., variable cost, labour cost and fixed cost. The former two costs are directly met by the farmer whereas the latter item of cost is borne by the farmer indirectly. It is, therefore, being said that costs on fixed items of expenditure does not abate even if the production of an enterprise is discontinued. In the present study, however, fixed cost is excluded from the cost of cultivation. Total cost represents only variable and labour cost. It could be seen from Table-2 that lobour cost accounted for Rs. 389.05 which formed 51.27%. Variable costs accounted a little less than one-half of the total cost. On an average Rs. 369.73 was spent on variable inputs. It could be clearly seen that labour cost has obviously exceeded the variable cost. The total cost therefore, worked out to Rs. 758.78 per acre.

Regarding returns from the crop it was a gross income of Rs. 2,251.15 resulting out of both from grain and straw. Farmers who had grown IET-1991, a high yielding variety of rice, collected a net income of Rs. 1,492.37 per acre.

Cost per producing 100 kg. of Grain :

Data was analysed to find out the cost of production for 100 kg. of grain, which in fact is considered as one of the important criterion before choosing the crop to decide whether the crop (or not is profitable to grow). It would be noticed from Table-2 in case of IET-1991, that only Rs. 40.84 was incrrued to produce 100 kg of grain of which Rs. 19.90 on variable costs andRs. 20.94 on labour cost.

2) The style of farm news for the radio

S. Mune Gowda, Agricultural officer, Bangalore.

Introduction :

Of all the radio programmes, news is more attentively listened to than others. Listening to radio news is more purposeful and careful. In India, particularly, where literacy is not high, where the oral tradition of learning is still widespread, where access to news to rural people is limited, news over the radio is more eagerly looked forward and listened to. Generally, even in advanced countries, the lower the living and the education standards of the audience, the higher they will be on the listening scale for radio news. The Indian rural audience, therefore need more news of farmers and farming than others.

Difference between radio news and news paper news :

Radio news is different from news paper news in appeal, content and presentation.

Radio news can reach larger and wider audience including the illiterate and the isolated and less exposed sections of the community than the news papers. Radio news is more persuasive as the human voice has more warmth than cold print.

Generally, in India, it is the men who read the news papers more regularly and frequently than women. But radio news is heard by men, women and children too. Although the appeal of radio news is wider for this reason, this very appeal limits the content of the news to a greater extent. Only such news as would appeal to both men and women will have to be included in the radio news bulletin.

Radio time is very precious and the time allotted for a news bulletin is less. A large number of varied types of news has to be packed into this less time. Naturally, the news has to be in broad strokes and has to omit many details. Unlike in a news paper, the audience cannot select any news that interest them. They have to take what is presented and when it is presented.

The ear unlike the eye, cannot take in and retain heavy news, statistics, geographical and other details. So radio news has to be light and lively.

As radio news is listened to in the privacy of homes simultaneously by all the members of the family, they should be such as are fit to be heard by the whole family. News with human interest are specially suited for being put over the radio.

Structure and presentation of radio news :

Since radio news is for the ear and not for the eye the structure and presentation is also different.

The 'inverted pyramid style' adopted for news paper news is quite unsuitable for the radio news. When we converse any piece of news to our friends we do not adopt this 'inverted pyramid style'.

The style to be adopted for radio news is the 'Conversational' style that we employ when speaking to people in their own homes, informal, simple, clear, easy flowing, short sentences, sometimes even half sentences and half phrases, simple, short, familiar words.

Such a style is easy on the ear of the audience and easy for the announcer to put the news over.

The simple sentences is the logical sentence and the one most used in conversation. The hearer can take it in one 'gulp'. The average length of the sentence should be kept to about 15 words - some shorter and some longer.

To acquire such a style, we have to read aloud while we write for the radio. If we do so, our style becomes speakable and listenable.

We must avoid 'S' sounds, too many 'Rs' and 'Bs' tongue twisters and alliterations.

Summary :

There is difference between radio news and news paper news. The 'inverted pyramid style' which is used for news paper news is not suitable for radio news. The 'conversational' style is more suited for radio news.

We must remember that, writing for the radio is not just writing. It is writing for our audience to listen to and for the medium we are using. We must suit the subject and style of our radio news to suit the radio audience and the radio medium.

Therefore, we must be careful in writing and presenting the radio news and the radio audience will understand better if it is presented in its style.

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V GLEANINGS FROM OTHER JOURNALS

I) Castor a good earner

The new strain SA-2 is considered a major breakthrough in castor research in Tamil Nadu.

It is ideally fitted for mixed cropping and very suitable for certain dry farming tracts, particularly when the monsoon is delayed.

The Department of Agriculture, Tamil Nadu, tried it out in several districts and found it at par with the earlier variety SA-1 in yield. But its duration of 95 to 100 days is shorter by about 45 days.

Mean yield :

The mean yield of the new castor is 918 kgs of seed/ha. It has an oil content of 52.6%.

The plants are short, with the main raceme at 25-35 cm. Branching is profuse, with three or four primaries and four to eight secondaries.

This variety can be grown as a mixed crop along with groundnut as both can be harvested together.

Zones differ :

It will not interfere with the main crop in growth or yield as the feeding zones of shallow-rooted groundnut and deep-rooted castor are different.

The castor plants also provide shade to the groundnut crop, thus helping reduce evaporation and ensuring better conservation of soil moisture.

SA-2 has also proved its worth as a pure crop in tracts of scarce rainfall in the State. It has yielded 625-1000 kgs per hectare of seed even under very unfavourable seasonal conditions.

It withstood drought and fetched a net return of 650-1000 kgs/ha when the traditional crops of Karungani cotton and jowar completely failed.

Good result :

It also fared well when tried in other States, proving that it is well adapted to the different agroclimatic conditions obtaining in the country.

In terms of oil production per day, SA-2, by virtue of its early maturing, gave 2.5 kgs against 2 kgs by SA-1 and 2.07 kgs by Aruna. The variety was found markedly free from wilt infection in Hyderabad.

Practices:

SA-2 has its own package of practices for the best yield. To begin with, four ploughings with an iron plough are needed to bring the soil a fine tilth.

For a pure crop six tons of cattle manure or compost, besides 30 kg N, 15 of P and 15 of K/ha, are to be applied as basal dressing.

The seed rate is 10/ha for adopting a spacing of 60 x 45 cm for a pure crop. For a mixed crop 5 kg with a spacing of 180 x 30 cm are needed.

The first hoeing and weeding is given about the 20 th day after sowing, followed by a second hoeing and weeding 20 days later.

Harrowings;

To safeguard against leaf eating caterpillars and the capsule borer spraying with Parathion 0.025% is recommended.

The crop is harvested when the capsules are completely dry. Since the main racemes mature earlier, it may be necessary to do the picking twice.

Late kharif:

The produce is thoroughly dried before the seeds are extracted.

The farmer stands to gain a net profit of Rs. 900/ha in a matter of just 100 days even under rainfed conditions.

Source: Farmfare, June, 1974

2) Dry kharif foodgrains

Maize and rice are the main kharif crops, beside groundnut, soyabean, chilli, onions, whose produce needs varying degrees of drying for safe storage. Drying is necessary as most of these crops at the time of harvest have a very high moisture content, which renders them unfit for safe storage as well as further processing. An expert committee of the Government of India has estimated that about 11% percent of rice and 7.5% of maize are lost during the post harvest handling at the threshing yard and during transportation, processing and storage (including losses due to rodents, birds, insects and diseases). About 50% of these losses can be avoided if the grains are dried to safe limits before processing and storage.

In India the farmers retain any where between 60–75% of their grain produce for their own use. The remaining 25 to 40% of the foodgrains are sold in the market and most of this is stored in large storage structures where the grain is preserved by spraying chemicals. Excessive use of chemicals on foodgrains is obviously objectionable. The safest method of preserving foodgrains is to store them, after drying them below the safe limit, in vapour-proof containers or structures. The safe limit is the maximum moisture content at which the grain can be stored without involving losses owing and the moisture. If the grain is stored at a moisture content higher than the upper safe limit, excessive grain losses will occur during the storage. Throughout the storage period, the moisture content of the grain should not rise above the upper safe limit which is about 10% (w.b.) for most of these crops.

Advantages of grain-drying

1. The crop can be harvested early to reduce field losses from shattering due to storms and natural winds.

2. It permits planning the harvest season to make better use of machine and labour.

3. Farm crops can be harvested even

when natural drying conditions are unfavourable provided mechanical devices are used for grain drying.

4. It permits storage of grain with out deterioration for a long time.

5. It maintains the viability of the seeds. High moisture content of the grains in the storage results in loss of germination in the seed.

Grains can be dried either by natural drying in the sun and stirring the grains periodically or mechanical drying. The various drying methods are given below:

1. **Solar radiation**:

This is the most common method followed in India for drying the threshed and unthreshed crops. This method consists of spreading the crop in a thin layer on the pucca floor or on metal sheets also placed in the Sun. The sheet-metal roofs are used for this purpose. If the floor is not pucca the use of a tarpauline or sheet is recommended for spreading the grains. The crop is stirred occasionally to permit uniform drying. Sun-drying is a very inexpensive method of drying, but has some draw-backs which are (i) It is unreliable and slow because of changing weather conditions; (ii) Wasteful because of the grain losses by birds, etc.; and (iii) Reduces the milling quality of the crops. So this method may be used only in the absence of other methods.

2 **Natural air-drying**:

Drying of the grains can be done in bins or other storage structures by circulating hot air in them. Air can be made to circulate with natural ventilation or forced ventilation.

In the case of forced ventilation, natural air is forced through the grain mass by a blower.

Forced ventilation is costlier but it is faster and more efficient than the natural ventilation. A system of ducts and perforated floor is commonly used to allow uniform drying of grains by dry air.

It is important to force only warm and dry air into the grain mass, otherwise the grain could absorb more moisture. Some advantages and disadvantages of natural air drying are as follows:

Advantages of natural air-drying.

1. Less initial equipment and running cost.
2. No expense for fuel.
3. Results in more uniform drying.
4. No fire hazards.
5. Little supervision required.

Disadvantages.

1. Drying rate is slow.
2. Drying depends on weather conditions.
3. More drying space is required.

3. **Heated Air drying**:

This is the most common method for drying large quantity of grain. This is like forced ventilation system except that the air is heated and for this purpose a heating unit is required. Air can be heated with electric heaters or furnaces utilising oil, gas, wood, charcoal, coke or farm wastes such as rice husk, etc. as fuels. The hot air dryers can be classified as in-bin type, batch type and continuous type or as portable and stationery types. Their proper and safe use

requires higher degree of skill and experience as compared to other methods described earlier. Some advantages and disadvantages of hot air driers are as follows :

Advantages :

1. Drying can be done in all types of weather conditions.

2. Time taken for drying is usually less than a day.

3. Drying capacity is higher.

4. The drying system is compact.

Disadvantages :

1. The cost of initial equipment and maintenance is high.

2. There can be fire hazards.

3. Considerable supervision is needed to keep the temperature within safe limits.

4. Aeration :

If the grain is dried to the safe limits before storing in the bins or other storage structures, which in turn are subjected to the seasonal changes in temperature and humidity, the moisture migration and temperature differentials occur within the grain mass in the storage structure. Thus at certain locations the moisture content of the grain in the storage structures rises above the safe limits causing favourable conditions for the growth of insects and micro-organisms which cause qualitative and quantitative damage to the stored produce. Forcing in of half dry air or natural aeration at such moments helps in reducing temperature and moisture in the storage thus prolonging the storage life of the stored produce. Aeration reduces the moisture content of the grain mass by 1-2%.

In addition to the above, a number of grain drying methods such as grain drying dehydration agents, vacuum thermal drying, infra red radiation, use of chilled and dehydrated air, etc. exist but they are beyond the reach of Indian farmers.

Source : *Progressive Farming, August 1974*

3) Utilisation of irrigation water

Useable Types of Water :

Opinions differ as to the upper limits of salinity above which water is no longer usable for irrigated and the figures given range from 0.6 parts per thousand to 3 parts per thousand dry residaul (or more for some species), subject to the adoption of certain precautions when it exceeds 0.5 parts per thousand.

In Tunisia (North Africa) many kitchen gardens are irrigated with water containing 2 gms. Sodium Chloride per litre. In Tripolitania (North Africa), where soil is mostly of high permeability, Della Gata says that relatively highly charged water can be used, with upto 10 parts per thousand dry extract.

In the Sahara Oasis, where water is brackish and the soil usually rich in gypsum, many kitchen garden species are successfully grown.

The maximum permissible saline content of water is dependent upon

the nature of the soil and sub-soil; the richer both are in organic matter and gypsum the higher the tolerence of the plants.

It is thus a wise precaution to use the most brakish water in those soils which are permeable, and rich in $CaCo_3$, and where ground water lies deep, as the excess salts can easily sink towards sub-soil. With heavy soils, however, relatively pure water, or water with a very low content of Na and Cl ions is needed, because almost all the salts remain in root zone, and if this soil is irrigated with water rich in Na and Cl ions, it becomes unfit for plant life.

The critical proportion of Na, not to be exceeded in the total cation content of water, is 50% if the soil does not contain gypsum ; in no case can 67% be exceeded without the application of the necessary correctives.

The higher the proportion of Na to Ca in water the less desirable is it to use that water; however $Ca+Mg > 2\,Na$, no serious solonetzification usually occurs. A low Ca/Mg ratio may have the same disadvantages as a low Ca/Na ratio. A high proportion of Na to Ca is more readily tolerated in irrigation water of low, than high salinity.

In principle the use of alkaline water (charged with Sodium Carbonate) is to be avoided, and it should not in any case be employed without the addition of a corrective.

All borated water is toxic, when the boran content exceeds 0.1 parts, per thousand, and unusable at 2 parts per thousand.

Finally it will be remembered that as a result of percolation and evaporation drainage water has always higher Na and Cl, and lower Ca and So_2, contents than irrigation water. These facts must be borne in mind in connection with the exchanges which take place in the soil and in considering the reuse of drainage water for further irrigation.

Lastly should water be clearly too saline for the purpose in mind, but its use be neverthless essential for lack of other water resources, the only solution left would be to consider correcting its composition before use.

Source : Utilisation of Saline Water (Review of Research)
Published by UNESCO, France.

Collected by : C. S. Jayetsen, Agricultural Officer, (Soil Chemist)
State Soil Survey Organisation, Bangalore.

1. A new record of UGA MENONI Kerrich as parasite of Epilachna Vigintioctopunctata (F.) in India :

Epilachna Vigintioctopunctata commonly known as epilachna beetle is a polyphagous pest causing serious damage to brinjal, tomato, tobacco, potato, pumpkins, gourds and other cucurbitaceous plants. To study the distribution of parasites of this pest, eggs, grubs and pupae of the beetle were collected during 1969 and 1970 and were maintained in the laboratory on brinjal leaves to obtain the parasites.

During the course of study, it was observed that the parasite Uga Menoni K. (Chalcididae: Hymenoptera) emerged mostly from the pupae and some times from grubs, though the parasite attacks the grubs of E. Vigintioctopunctata.

According to Dr. Foote, U.S.D.A., this species of parasite has not previously been reported from E Vigintioctopunctata, although the species Uga Colliscutellum (Girault) has been recorded from this host in Australia.

2. Suitable season and depth of planting Cardamom suckers :

Cardamom being a cross pollinated plant, gives rise to highly variable seedling progenies. To overcome this disadvantage, vegetative propagation by using a sucker or suckers on a section of rhizome is recommended for multiplying high yielding clumps of cardamom. Since a section of rhizome separated from the selected clump will have a fresh cut surface, it is essential to find out suitable date and depth for planting to avoid high mortality of the sets from rotting due to uncongenial soil conditions in such of the cardamom belts where the rainfall and topography vary considerably.

At Mudigere where nearly 40% of the average rainfall of about 2500 mm is received in the month of July alone, an experiment with four planting dates (second fortnight of June, first and second fortnight of July, and first fortnight of August) as main treatment and depth of planting (surface, 6 inches and 9 inches) as 3 subtreatments, was conducted during 1967-68. The results showing the mortality of suckers in different treatments indicated that it is advisable to take up surface planting of cardamom suckers after the heavy showers are over i.e., in the first fortnight of August. The suckers planted during first fortnight of August showed low mortality of 25% as against high mortality of 65, 53 and 76% in respective fortnights during last part of June and entire part of July. Surface planted sucker in the first fortnight of August showed least mortality of 17.5%.

3. Causes for low germination in Sesamum variety C–50 :

Sesamum variety C–50 suffers from low germination (25 to 65%) in a

normal condition. Efforts were made to find out the causes for low germination of seeds. Sample seeds were collected from the capsules of bottom (capsules from 0-20 cm from first node at ground level) mid (capsules from 20 to 40 cm) and top (capsules from 40 to 60 cm) position on the plant. As a control, mixture of seeds from all the positional capsules were taken. In all there were four treatments and five replications. Sesamum plants for this study were collected from general crop raised at Field Unit of Agricultural College Farm, Dharwar, during 1972-73 kharif. Crop was sown on 5th July, 1972 and harvested on 13th October, 1972. The data was transformed and statistically analysed.

Results indicated (Table I) that the germination of seeds from bottom capsules was significantly higher (81%) than that obtained from the seeds of mid (65%), top (56%) and control (71%). Significant reduction in germination percentage was noticed from the seeds of mid and top capsules. This reduction in germination of seeds of top and mid capsules when compared to the germination percent of the bottom capsule seeds might be due to the fact that flowering in sesamum goes on in acropetal succession and capsules formed early at the bottom position will get sufficient time to attain physiological maturity when compared to the seeds of the capsules formed late at mid and top positions. Generally harvesting is done once when all the capsules turn yellow irrespective of the stage of maturity of the various positional capsules. Mere yellowing of the late formed capsules would not indicate the physiological maturity. Yellowing of top capsules could be due to other reasons than ageing maturity. Obviously significant low germination was observed in the seeds of control which are mixture of seeds from all capsules and very well compared to normal seeds used for sowing. This low germination in control might be due to presence of seeds from late formed capsules (mid and late position).

TABLE-I

Germination of sesamum (C-50) seeds in various positional capsules.

Treatment	Germination percent	
	Actual	Transformed
Seeds from bottom capsules	81.0	64.2
Seeds from mid capsules	64.7	57.7
Seeds from top capsules	55.8	48.3
Cantrol (Mixture)	70.8	60.0
C. D. at 1% level		1.28

To avoid indiscriminate harvesting to get better seed, further studies are essential on the time required for a capsule to attain physiological maturity irrespective of its position ; and proper time of nipping to avoid late forming of capsules which is the source of low germination in seeds of sesamum C-50.

4 Long Boll mutant in Cotton (G Hirsutum L) Variety Hampi

In the nucleus stage crop of cotton, variety Hampi, during 1972-73, a mutant plant for long boll character was noticed. Next year it was grown along with normal plants in non-replicated progeny rows. The long boll mutant in Hampi almost looked morphologically alike but for its distinctly longer and larger bolls than those of normal Hampi. It was subjected to 't' test in respect of boll length and diameter, in comparison with normal bolls. Besides other characters like boll weight, locks per boll, seeds per boll and seed index were studied.

TABLE–I

Progeny mean of long boll Hampi mutant vs. normal Hampi

Character	Long boll Hampi Mutant	Normal Hampi	Percentage increase over normal
Boll length cm.	5.96*	4.56	30.70
Boll diameter cm.	3.39*	3.38	10.08
Boll weight g.	5.52	4.50	22.66
Locks/boll	4.28	3.60	18.88
Seeds/boll	32.00	29.40	8.84
Seed index g.	11.02	10.12	0.89

* Significant at 5% level of probability.

The details of characters as indicated in Table–I, showed that long boll mutant is superior to normal Hampi plant in respect of the characters studied.

The critical evaluation of the long boll mutant is in progress with respect to agronomic and economic attributes.

5. Exposing the Cardamom panicles from a layer of leaf mulch to open pollination by bees and thereby improving the fruitset

Cardamom is a cross pollinated plant and bees are found to be the major pollinating agents. In the cardamom plantations, the flowering panicles of prostrate type of cardamom will be lying covered under layer of fallen dry leaves of shade trees, till the commencement of the first harvest towards the end of August or beginning of September, when the leaf mulch is usually removed according to the old practice. As a result of this covering, it was observed that there were practically no capsules on the first half of the panicles as the flowers were not exposed to pollination by bees. In order to see the worth–whileness of uncovering the panicles at the commencement of flowering itself, the following observation was made.

On 30-4-1970, ten healthy cardamom clumps of prostrate type were selected and in each clump, 3 to 4 panicles were kept covered under the leaf mulch and an equal number of panicles were exposed from the leaf mulch. On 23–6–1970, the number of capsules that were developed on both the covered and exposed panicles were counted. The average number of

capsules that were formed per panicle was 27.4 and 2.1 in the case of exposed and covered panicles respectively. The covered panicles were etiolated and were of unhealthy appearance. From the above observation, it was clear that the practice of uncovering the panicles shortly after the commencement of the flowering that is in the month of May, considerably improves the fruitset in cardamom. While uncovering, care should be taken to see that the panicles are just lifted and placed above the layer of mulch which would protect the surface soil is not displaced from the base of the clumps. This operation is of great importance particularly when the cardamom clumps are grown under the shade of such of the trees eg. Artocarpus sp. Ficus sp. which shed their foliage completely during the fruit setting season of cardamom.

Source: Current Research, August 15, 1974, U.A.S., Bangalore

VII News in brief

1. Agriculture Commission Meets Karnataka Ministers:

The National Commission on Agriculture held its meeting recently at Bangalore and heard representations of the Karnataka Government, the Presidents and Secretaries of Taluk Development Boards and Progressive Farmers on various aspects of agriculture. Hon'ble Ministers for Public Works, Social Welfare, Revenue and Horticulture attended the meeting presided over by the Chairman of the National Commission on Agriculture Mr. Nathoram Mirdha.

2. Sugarcane Price:

The Government of India has fixed the minimum price for sugarcane for the year 1974-75 season at Rs. 8.50 per quintal from October 1st, 1974. This price is for a basic recovery of 8.5% or below subject to a premium of 10 paise for every 0.1% increase above that level.

The present minimum price is Rs. 8/- per quintal of sugarcane linked to a recovery of 8.5% or below with a minimum of 9.4 paise for every increase of 0.1% in recovery above 8.5%.

3. Crop Insurance:

The General Insurance Corporation is considering more pilot schemes of crop insurance covering groundnut and cotton.

The first experimental scheme was taken up in Gujarat by Life Insurance Corporation for Hybrid-4 cotton and was taken over by General Insurance Corporation later.

Similar schemes are being thought of for cotton in Andhra Pradesh, Karnataka, Maharashtra, Rajasthan and Tamil Nadu and for groundnut in Andhra Pradesh, Gujarat, Tamil Nadu and Madhya Pradesh.

4. Steep fall in groundnut production in the country - contingency plan for production of oilseeds:

On account of the unfavourable seasonal conditions in Gujarat and also due to the sub-normal rains in Andhra Pradesh, South Karnataka, parts of North Karnataka and Madhya Maharashtra, upto the middle of September, there is likely to be a steep fall in the production of groundnut in the country. The Government of India have taken serious note of this situation and the I.C.A.R. has formulated the following measures for Karnataka as a part of the national effort to bridge the gap in production of Oilseeds.

1. To concentrate on groundnut production in irrigated areas;

2. Mid season correction with Sunflower in South and North Karnataka; and

3. Extensive Substitution with Sunflower in the coming season in place of Wheat.

VIII DEPARTMENTAL NEWS

a. Director's Tour

The Director of Agriculture was in Tumkur on 3.8.74 and held discussions with the Deputy Director of Agriculture with regard to distribution of fertiliser cards and also inspected the Farmers Training Centre at Chikkanahalli. He proceeded to Holalkere on 4-8-74 and participated in the food production meeting presided over by the Hon'ble Chief Minister. He was in Harapanahalli on 6-8-74, where, he held discussions with the Departmental Officers, T.D.B. Presidents and local farmers with regard to problems encountered in kharif production drive. He held discussions with the Deputy Commissioner, Bellary about the distribution of fertiliser cards. He was in Siruguppa, Dhadesugur and Gulbarga on 7-8-74 where he visited the Agriculture Research Station, Agricultural School and Upper Krishna Project laboratory respectively. He also held discussions with the Divisional Commissioner, T. D. B. Members and Departmental Officers at Gulbarga about the agricultural programme of the district. He was in Siruguppa again on 8-8-74 where he inspected hybrid bajra and jowar plots and also demonstration plots laid out by the India Potash Agency and Seed Farm, Soil Testing Laboratory, Soil Conservation Training Centre and Agricultural School at Kotnur. He went to Bhalki on 9-8-74 and inspected the Seed Farm and attended the District Development Council Meeting at Bidar. He was in Bellary again on 10-8-74 and inspected Soil Testing Laboratory, The Pilot Project Office and reviewed the agricultural Programmes of the district at the Office of the Deputy Director of Agriculture, where he also addressed the training programme organised by the Jaycees at Fordell School. He was in Arsikere on 17-8-74 and inspected Seed Farm at Yelaware and also participated in the field day at Haranahalli. He proceeded to Mangalore and visited flood affected areas in the district where he also held discussions with the Joint Director of Agriculture, Deputy Director of Agriculture and Officers of the Agro-Industries Corporation with regard to stock position and supply of fertilisers. He proceeded to Kudige on 19-8-74 and inspected the Agricultural Farm. He left for Hyderabad on 21-8-74 to attend the meeting of the working group on strategy for agricultural planning in flood prone areas set up by the National Commission on Agriculture. He was in Mysore on 22-8-74 and addressed the trainees of the Administrative Training Institute.

b. Promotions and Transfers: Nil.

c. Schemes: Nil.

d. Publications, Extension materials and Radio Talks:

Fortnightly seasonal tips for the

benefit of the farmers in the State for the month of September, '74 were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various local dailies for publication. The same was also sent to the All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'.

Kannada version of the Package of Practices for High Yields 1974," and "Efficient Use of Fertilisers" were got printed. The same are being distributed to the technical personnel of the Department.

Compiled by :

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farm front

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FARM ADVISORY AND EXTENSION SERVICES

IN THIS ISSUE

Cover :

Good showers have been received in all over the rabi tracts of the State and these have greatly helped to take up sowings in the entire tract. Rabi jowar, which is the staple crop, is grown extensively in these areas. A major effort is underway to boost Rabi production.

I can easily see that the Department of Agriculture can do a lot more than what is being done at present. Organisations like ours are called as 'goal oriented systems' which are essentially instruments designed to achieve certain specific social purposes. The Department of Agriculture in particular is set up for the purpose of helping the farmers in increasing agricultural production, in conserving and developing production resources like soil, water and vegetation on one hand, and on the other, performing some regulatory functions with regard to farm inputs like fertilizers, chemicals and seed materials. The efficiency with which these specific purposes of the Department are achieved will depend largely upon the awareness of these purposes on the part of the individuals and groups who make up the Department as well as on the competence they acquire to discharge these responsibilities.

Taking a close look at the different levels of our organisation, in the last few months, I can now identify a few areas where we need to strengthen the set up, immediately. I may enumerate these four areas of competence in the following terms:

1. The need for stepping up the technical competence at the operational level, supervisory level and Subject Matter Specialists' level ;
2. The need for strengthening extension education competence at these three levels ;
3. The need for acquiring capabilities related to programme planning and implementation; and
4. The need for improving the administrative and the managerial abilities.

We may examine each one of these areas a little further in order to gain some practical insights.

1. Technical Competence:

A major contribution of the Department to the development of agriculture should come in the form of new technologies that we can place before the farmers as alternatives to what they are doing. These alternatives should be more productive and more profitable. Most of the time, such alternatives emerge from the findings of research. As long as the Department can demonstrate to the farmers a better way or a more economic way of crop or animal production, there is a justification for the existence of this organisation. Once it ceases to be useful to the

farmers in terms of providing them some improved ways of agriculture, it need not exist any more as an extension agency.

At present a large part of our agriculture is still traditional. It therefore lends itself for vast improvements. On the other hand, there is a good deal of accumulated scientific information which can be formulated into useful farm technologies to be made available to the farmers. But, in practice, there appears to be many gaps. The sources of new information like research stations, laboratories and scientists are not properly linked up with the operational levels consisting of the Subject Matter Specialists, the Agricultural Extension Officers and the Gramsevaks. It is necessary that these links are quickly built up. It is not enough if this communication net work is established. What is of paramount importance is to put it into effective use. In other words, all the elements in the organisation should become thoroughly conversant with the latest technical information that has an application on the field.

2. Extension competence :

Acquiring new technical knowledge of practical utility is one thing, and getting the knowledge accepted by the farmers is another. The agricultural scientist works directly with physical and biological entities. He can thus by-pass the human medium i.e. farmer. But the task of the extension worker is different. The latter will have to put his ideas into practice through the farmers and it is well-known that farmers are not a captive audience, and are not compelled to do what they are told. However, there is a discipline called Extension Education which provides the extension workers with effective insights as well as means and methods by which they can influence the farmers to pay due attention to what he recommends to encourage them to consider and evaluate what is presented to them and to accept and adopt what is considered as useful to them. Quite often the agricultural functionaries in the Department come into the extension positions without adequate training in extension education. This is a basic handicap, today. A greater danger is that those who come into extension positions also think they know all about extension. This comes in the way of their professional improvement. It is very necessary that our extension functionaries are systematically introduced to the concepts and philosophy of extension education and are adequately trained in using extension methods and techniques, effectively.

3. Programme planning :

Agriculture is a season-bound operation. In the course of

changing agriculture from its traditional to modern base, enormous efforts are required. On the one hand, new knowledge which is not known to the farmer will have to be made available to them in such a manner that it is applied in its proper form. On the other hand, most of such new technology involves the use of purchased inputs. For instance, when a farmer changes over from local jowar to hybrid jowar not only the knowledge of the new variety and its production techniques, but also the new inputs like certified seed, chemical fertilisers, plant protection chemicals etc., would be needed by him. When changes in farming are brought about through thousands of farmers in thousands of acres, in wide areas, in a given season, the man incharge of the agricultural development should not only plan for the transfer of new technical knowledge, but also for the supply of inputs and organise services, according to time schedule. He should fix responsibility to specific individuals, and ensure that things take place as per the plan of action. Such a function of systematic programme planning and implementation is an essential part of agricultural development. But, very rarely the officers of the Department are trained in programme planning. However, the importance of acquiring abilities in programme development and execution cannot be overlooked.

4. Administration of Agricultural Development :

Each taluk or district is a unique agro-climatic area. Specific programmes of agricultural development can be formulated for these areas by competent technologists using the specifics relevant to the situation. A major responsibility of the District Agricultural Officer is to work towards the objectives setforth in these programmes. For this purpose he is provided with different categories of staff, physical facilities and financial provisions. How exactly he uses these resources at his disposal, and how adequately he realises his objectives will depend upon his administrative abilities. People who acquire this ability, either through training or experience, can always emerge as better administrators of agricultural development. Those who are not trained in administration and do not conscientiously acquire this from experiences, will naturally get separated as ineffective agricultural officers. There is enough theoritical knowledge in the areas of administration and management relevant to developmental activities from which certain important lessons could be learnt by the officers of the Department of Agriculture.

From the foregoing, it may be seen that a competent

Agricultural Extension Officer at the taluk level, an effective Subject Matter Specialist and an able Deputy Director of Agriculture at the district level need to be trained adequately in these four areas. No doubt, the relative importance of each of these aspects will vary with the level at which a given agricultural functionary is working. For instance, the Agricultural Extension Officer should be more thoroughly concerned with the first three areas while he should be knowledgeable in the last. A Subject Matter Specialist again needs to be much more concerned with the technical knowledge and to some extent with extension education, programme planning and managerial competence. On the other hand, the Deputy Director of Agriculture should not only be competent in the first three areas but also well versed in administrative and managerial matters.

A deliberate attempt has to be made by each of the members in the district to understand these aspects and to acquire the needed abilities in all these four areas. The department is also working with University to develop short courses covering these aspects. But individuals who have made earnest efforts in this direction on their own will gain more from such courses than those who come without any preparatory efforts.

R. Dwarakinath
Director of Agriculture

II The month in retrospect

(Seasonal crop conditions during September, 1974)

The long spell of dry weather which prevailed in many parts of the State was broken and fairly good and wide spread showers were received in almost all the districts, thus bringing great relief to the cultivators of the State. These showers have not only helped the kharif crops to recover but also brightened the prospects of Rabi/Summer crops. The agricultural situation in brief is given below for each divison.

Bangalore division :

Good rains were received in the districts of Bangalore, Kolar, Tumkur, Chitradurga and Shimoga. These showers were a boon to the standing kharif crops. Sowing of sunflower, rabi jowar, cotton and safflower, harvesting of groundnut, hybrid jowar, hybrid maize, picking of cotton, grading of V. F. C. tobacco, transplanting of beedi tobacco, weeding, interculturing and top dressing of paddy and ragi, were some of the important agricultural operations carried out. Stemborer on paddy and ragi, aphids, jassids, mites and bollworms on cotton were noticed against which necessary control measures were taken up.

Mysore division :

Widespread showers were received in Mysore, Mandya and Hassan districts whereas rainfall was scattered in the districts of Chickmagalur, South Kanara and Coorg districts. Harvesting and threshing of hybrid jowar, hybrid maize and ragi, sowing of pulses and sunflower, weeding, interculturing and top dressing of paddy, harvesting of groundnut, raising of paddy nurseries for rabi planting, and preparation of land for rabi sowings were some of the major agricultural operations carried out. Case worm, leaf roller, thrips and stemborer on paddy, earhead pests on hybrid maize, aphids, jassids, mites and bollworms on cotton were noticed for which necessary plant protection measures were taken up.

Dharwar division :

Fairly good showers were received in the districts of Dharwar and North Kanara, which was helpful for the standing kharif crop as well as sowing of rabi crops. Sowing of cotton, harvesting of pulses, groundnut, hybrid jowar and interculturing, weeding and top dressing to the standing kharif crops were the major agricultural operations carried out. Cut worm and gall fly on paddy and earhead pests on hybrid jowar were noticed against which necessary plant protection measures were taken up.

Belgaum division :

Good showers were received in Belgaum and Bijapur districts. These showers were of immense help for

sowing of rabi crops. Important agricultural operations carried out were harvesting of potato and groundnut, sowing of rabi jowar and cotton roguing and detazzling operation in hybrid maize seed production plots and plant pretection measures on standing crops. There was no report of incidence of serious pest and disease attack.

Raichur division :

Good rains were received in the districts of Raichur and Bellary. These rains were a boon to late sown kharif crops and also sowing of rabi crops. Interculturing, weeding and top dressing of standing kharif crops, harvesting of hybrid jowar, sowing of cotton and sunflower were some of the agricultural operations carried out. Aphids, jassids, mites and bollworms on cotton, stemborers and aphids on hybrid maize and earhead pests on hybrid jowar were noticed. Necessary control measures were taken up to check the further spread of pest and disease attack.

Gulbarga division :

Fairly good showers were received in Gulbarga and Bidar districts. Kharif crops like groundnut, paddy and bajra which were withering have recovered. Agricultural operations like sowing of bengalgram, harvesting of hybrid jowar, greengram, blackgram, navane, sesamum and hybrid maize were carried out. Aphids, jassids, leaf spot and bollworms on cotton were noticed against which necessary control measures were taken up. All the crops were attacked by rodents and rodent control measure was taken up as a custom service.

III INPUTS FOR FARMERS :

a) Fertiliser cards :

Out of 24,06,684 cards supplied, 16,12,932 cards have been distributed so far.

b) Plant protection chemicals :

Though the supply position of pesticide is not quite encouraging, the Agro Industries and Marketing Federation have made arrangement to stock 2,594 M. T. of dust formulations and 58,080 ltrs. of liquid formulations in their Agro Kendras and Central Depots.

Govt. of India have alloted the following quantities of Technical Grade pesticides to the State :

D.D.T.	35	M.T.
B.H.C.	40	,,
Malathion	30	,,
Dimethoate	5	,,

The quotations for formulations of different pesticides in various packings from different formulators have been received. This will help in meeting the State requirement of pesticides to some extent. The formulators are committed to sell the pesticides to the State agencies only. A State Level Committee has been constituted to consider the allotment of Technical Grade pesticides to the formulators.

The supply position of rodenticides in Gulbarga and Bidar Districts has been improved. The Agro Industries has purchased 5 M.T. of Zinc phosphide from U.P. Apart from this they are making arrangements for purchase of 2 M.T. of Aluminium. Phosphide.

IV ARTICLES

1. Economics of hybrid jowar (CSH-1) cultivation

A. T. Kagali, DDA, (Farm Management) Hebbal, Bangalore-24 and
Radhakrishna Setty, AAO (Farm Management) Hebbal, Bangalore-24

Next to paddy and wheat, sorghum or jowar has the largest area among the Indian food crops. It is the staple food of the poor classes in the relatively dry tracts of Central and Southern India. The plant stalks, green or dry, provide nutritious fodder for cattle. The total area under the crop during 1972-73 in the country was about 14,810 thousand hectares. The national production of this crop is about 6,442 thousand tonnes. In Karnataka State the crop is grown on an area of 17,93,472 hectares, with an annual production of 10,81,832 tonnes. CSH-1 and CSH-2 are the two popular hybrid varieties of jowar, which were released during the year 1964 and 1965 respectively for general cultivation. CSH-1 is recommended for the jowar growing regions of the State. In this paper an attempt has been made to analyse the costs and returns involved in the production of CSH-1 jowar.

The Sample:

The data analysed in this study was collected from the pocket diaries of National Demonstration Plots laid out by the Agricultural Department in the State. The data analysed was pertaining to the 14 National Demonstration plots laid out under irrigated conditions during kharif and summer seasons (1972-73) in different districts of the Karnataka State. The details regarding the name of the demonstrator, village, taluk and district are presented in Appendix-I.

Cost return relationship:

In the present study only the variable costs of cvltivation, such as costs incurred on seeds, manure, fertilizers, plant protection chemicals, human and bullock labour and irrigation charges are considered.

The fixed costs like the rent and rental value of the land, depreciation charges, land revenue and the interest on investment are not included as the data on these were not available.

Table-1 presents the costs incurred on different inputs. The total costs per acre was Rs. 539.11. On an average Rs. 24.85 or 4.60% of the total variable costs was spent on seeds and Rs. 103.55 or 19.21 of the total variable costs was spent on manure. Nearly 34.20% of the variable costs or Rs. 178.99 was spent towards fertilizers. As much as Rs. 170.42 or 32.33% of the total variable costs was incurred on labour charges (which included both human and bullock labour charges). The expenses towards plant protection chemicals

TABLE-1

Cost of cultivation of Hybrid Jowar (CSH-1 variety) in Karnataka State during the year 1972-73

Sl. No.	Items	No. of cases	Total area in acres	Costs incurred for the whole area (Rs.)	Costs/acre (Rs.)	Percentage to total cost
1	Seed	14	20.00	496.91	24.85	4.60
2	Manure	14	20.00	2,071.00	103.55	19.21
3	Fertilisers	14	20.00	3,579.75	178.99	34.20
4	Plant protection chemicals	14	20.00	507.10	25.36	4.70
5	Labour charges (Human and Bullock)	14	20.00	3,408.45	170.42	32.33
6	Irrigation charges	14	20.00	535.00	26.75	4.96
7	Total variable costs	14	20.00	10,782.21	539,11	100.00

and irrigation charges was Rs. 25.36 or 4.70% of the variable costs and Rs. 26.75 or 4.96% of the variable costs respectively.

Thus, from the above discussion, we can conclude that the cost of manure, fertilisers and labour were the main items of variable costs which accounted for Rs. 452.96 or 85.74% of the total variable costs per acre. The cost of cultivation on the remaining three items namely, on seeds, plant protection chemicals and irrigation charges was Rs. 86.15 or 14.26% of the total variable costs.

Yield gross and net income:

The per acre average yield of grain and straw was respectively 1908 and 3147 kgs. The total amount realised from grain and straw was Rs.2,041.42 (from grain Rs.1,746.13 and from straw Rs.295.29). The per acre net income after deducting the total variable costs of Rs.539.11 from the gross income of Rs.2,041.42 was Rs.1,502.31.

TABLE-2

Average yield, gross and net income obtained per acre in the cultivation of Hybrid Jowar (CSH-1)

Sl. No.	Items	Quantity	Amount Rs. Ps.
1	Yield (kgs)		
	a) Grain	1,908	1,746.13
	b) Straw	3,147	295.29
2	Gross income	-	2,041.42
3	Total variable costs	-	539.11
4	Net income	-	1,502.31

APPENDIX–I

List of selected demonstrator Farmers, their Village, Taluk and District

No.	Name of the demonstrator	Village	Taluk	District
	Sriyuths			
1	Mushappa Mangli	Bhadrapur	Navalgund	Dharwar
2	M. P. Chokda	Holesamandur	Aurad	Bidar
3	Vittal Shastry	Andena	Bidar	Bidar
4	Hire Gowder, F. B.	Hoolihalli	Ranibennur	Dharwar
5	Shankar Gowda	Syahatti	Hubli	Dharwar
6	Basavraj Patel	Kardyal	Bhalki	Bidar
7	V. Nagendrappa	Varadahalli	Hosapet	Bellary
8	N. Bayalappa	Dharmasagar	Hosapet	Bellary
9	B. A. Saranada Gowdar	Bagalkote	Bagalkote	Bijapur
10	P. Sathyanarayana	Kondlahally	Molakalmur	Chitradurga
11	Shadaksharappa	Bada	Davangere	Chitradurga
12	Madar Kale	Naregal	Ron	Dharwar
13	T. S. Neminath	Avargere	Davangere	Chitradurga
14	Shankarappa	Kovalli	Bilagi	Bijapur

2. How to increase wheat production

M. V. Rao, Co-ordinator, All India Wheat Improvement Project, New Delhi.

The doubling of wheat production between 1967–68 and 1971-72 has been, as one of the most significant achievements of India after Independence. In fact there was a feeling at that time that India is in a position even to export 1 or 2 million tonnes of this cereal. While there was very possibility to maintain this upward trend in wheat production, there was a sudden shortfall by 1.5 million tonnes in 1972–73 and a further shortfall in 1973–74. The wheat production thus has started declining for reasons too well known which clearly shows that besides the scientists and a dependable or workable agricultural technology, many other factors are important to sustain production. It is necessary that this downward trend in production is arrested, as the international prices of wheat, fertilizers as well as freight charges have gone up by 400 to 700% in the last two years. The shortfall in 1974 kharif food grain production in India due to drought and floods makes it all the more important that wheat production in rabi 1974–75 is considerably stepped up.

It is possible to increase wheat production in India to 30.5 million tonnes which is about 15% over the 1971–72 figure of 26.47 million tonnes, provided all out efforts are made at every level, to achieve this target. Scientific technology is available for achieving this objective and what is needed to boost up production are making available the required inputs, incentive price policy, transfer of technology on a wide scale to every farmer and harmonious coordination of the activities

of different scientific, administrative, and extension agencies.

How to increase wheat production in 1974-75.

During the 13th All India Wheat Workers' Workshop meetings held at the Punjab Agricultural University, Ludhiana in August, 1974, the wheat scientists from all over the country discussed the ways and means by which wheat production could be increased in 1974-75. These could be broadly summerised into two categories viz., production and protection.

(A) Production:

(i) Varieties:

The farmer should first know what variety of wheat to grow on his farm and how to grow it. The varieties recommended by the different governmental agencies for each State of the country, and which are new in the field, can be broadly categorised into four classes depending upon whether they are suitable for,

1. Irrigated good fertility normal sown conditions
2. Irrigated low fertility normal sown conditions
3. Irrigated good fertility late sown conditions
4. Rainfed low fertility normal sown conditions

Some varieties are widely adapted for the State as a whole while others are suitable only for specific areas and conditions, within a State. Some varieties which were recommeded for cultivation have not found favour with the farmer over a period of time. Hence names of such varieties are not included in this list. The different wheat varieties suitable for different conditions and parts of the country are indicated in Table-1. The dwarf wheats are better than the tall desi wheats at all fertility levels although, they are outstandingly superior at high fertility levels. The farmer should make sure that he is getting the pure seed of the variety he is planting.

ii) Package of practices: Having identified the variety for his farm the farmer should know how to grow it and get the best out of it. The seed bed should be prepared well and, there should be enough moisture to ensure good germination and stand. Sowing by seed drill always gives better and early germination and stand.

1 For irrigated good fertility, timely sown conditions:

a) Sowing date ;

The first fortnight of November is the most optimum time for planting wheat for the country as a whole. In the north-western State like Punjab, Haryana, Northern Rajasthan, Western U.P., Delhi and Jammu, the first fortnight is optimum for medium late maturing varieties like Kalyansona, PV-18 etc. while for early maturing varieties like Sonalika the second half of November is optimum. If Sonalika is sown early, its yield will be low.

b) Depth of seeding:

Seed should be put 5-6 cms. deep in the soil.

c) Seed rate:

Normally 75-100 kgs/ha for average sized grain types. For bold seeded wheats like Sonalika it is 100-125 kgs.

d) Spacing between rows : 22.5 cms.

e) Irrigation :

4-6 irrigations. The irrigation at the crown root initiation stage which is generally 20–25 days after sowing is very important. Other irrigations should be given at late tillering, late jointing, flowering, milk and dough stages. In light sandy soils 2 or 3 extra irrigations are needed. Where water is in short supply then the farmer should know when to give it for getting the maximum advantage. If water is available for only one irrigation, it should be supplied at the crown root initiation stage. If available for two irrigations, the first irrigation should be applied between crown root initiation. and late tillering stage and, the second irrigation after 5–8 weeks. In Peninsular and Central India wheat crop takes much less time from seeding to seed as compared to what it takes in north India and hence the irrigation timings are to be adjusted. If water is available for three irrigations then the first irrigation should be given at crown root initiation stage and the second at late jointing stage and, the third at milk stage.

b) Fertiliser requirements :

i) Where fertiliser is in short supply:

Nitrogen	60-80 kgs./ha.
P_2O_5	30-40 kgs./ha.
Potash	20-25 kgs. K_2O/ha.

ii) Where enough fertiliser is available :

Nitrogen	100–120 kgs/ha.
P_2O_5	50–60 kgs/ha
Potash	40 kgs K_2O.

Normally Indian soils are not deficient in Potash. Potash and Phosphorus application should be based on soil tests, to have a balanced application of the major nutrients. Half of nitrogen and all Potash and Phosphorus and K should be drilled about 5 cms. below the seed at the time of sowing. The remaining half nitrogen should be top dressed at the time of first irrigation.

2. For irrigated good fertility, late sown conditions :

It is not economical to plant wheat after the 3rd week of December. Late sown wheat will have to be given at higher seed rate 125 Kgs./ha, and a closer row spacing of 15 to 18 cms.

The fertilizer recommendations for late sown wheat are :

Nitrogen	60-80 kgs./ha
Phosphorus	30-40 kgs.P_2O_5/ha
Potash	20-25 kgs. K_2O/ha

As in the case of wheat sown under normal conditions, half of nitrogen and all of potash and phosphorus should be placed 5 cms. below the seed at the time of sowing and the remaining half Nitrogen to be top dressed at the time of first irrigation. Potash and phosphorus and K application should be based on soil tests.

3. For rainfed conditions :

Time of sowing:		Second fortnight of October
Seed rate	:	100 kgs/ha.
Row spacing	:	22.5 cms.
Nitrogen	:	40 kgs/ha.
Phosphorus	:	22 kgs. P_2O_5/ha.
Potash	:	Nil.

All Nitrogen and Potash should be applied 10 cms. deep (3-4 cms. below the seed) at or before sowing.

4. Micronutrient deficiencies :

Certain areas in Punjab, Himachal Pradesh, Bihar, Madhya Pradesh,

Gujarat, Haryana and Tarai areas of U. P., are showing deficiencies of micronutrients like zinc. Application of Zinc sulphate at 10–25 kgs/ha as a prophylactic measure in the areas is suggested to soils actually found deficient in Zinc by soil tests. This chemical has to be applied in higher doses as recommended by soil experts. In Punjab, in the last two seasons, deficiency of sulphur is also reported.

5. Growing of wheat in saline-alkali soils :

More than 7.0 million hectares in India have salinity-alkalinity problems. However, good crops of wheat (30-40 qtls. ha) can be taken on these lands by proper agronomy and selection of right variety. Varieties like Kalyansona, Sonalika, Hira, WG-357 Moti, HD–1944, C–306 etc., were found to do well even on alkali soils. The following agronomic practices are suggested (after choosing the right variety) for growing wheat in alkali soils :

1. Reclaim the land by leaching of salts, application of gypsum and, growing of Dhaincha and rice between April-November.
2. Pulverise the soil and keep sufficient moisture for good germination of wheat seed.
3. Sow wheat before third week of November at the seed rate of 100 kgs./ha, preferably by drill.
4. Apply N.P.K. in the ratio of 120 : 60 : 60 kgs./ha. (a little higher dose than what is needed in normal soils).
5. Apply light and frequent irrigations (9–10).

6. Companion cropping of wheat :

Good crops of wheat can be taken in the space between the rows of sugarcane, potato etc. Yields upto 3-4 tonnes/ha are possible under these conditions without seriously affecting the yields and quality of sugarcane or potato . The wheat grain and straw are a 'bonus' to the farmer in these 'row crops'.

b) Protection of the wheat crop :

Wheat is attacked by a number of diseases, pests and nematodes which often cause heavy losses. Weeds are another big problem in many wheat fields causing huge losses. Some of these can be prevented, controlled or losses due to them minimised, if timely action is taken.

1. Control of weeds :

Different types of weeds are important in wheat fields in different states. Most of the broad leaved weeds are controlled by 2, 4-D applied at 0.42 kg acid equivalent/ha in 600–700 litres of water, between 4-6weeks after sowing. Incorporation of Avadex BW in the seed bed at a precise depth of 3-4 cms. as a pre-emergence treatment and at the rate of 2.5 litres/ha controls wild cats. Similarly TOK E-25 applied at 5.0 litres/ha as a pre-emergence treatments controls the Canery grass-Phalaris minor and some of the broad leaved weed like Chenopodium. Time and precision are crucial in weedicide use.

The most important diseases of wheat in India are the rusts (black, brown and yellow) followed by the smuts, leaf blights, foot rots and powdery mildew. The most effective

and economical way of controlling most of the diseases is by growing resistant varieties; others can be kept under check by taking seed from healthy seed stocks, while others need control measures.

Rusts :

Yellow rust is a problem in the hills and plains of north India while black is more important in southern, central and eastern India. Brown rust is a problem all over India. Varieties indicated in Table I are the best available for the time being for growing in the areas specified therein.

Dithane Z78 if sprayed at a concentration of 0.2 % as a prophylactic measure few days earlier to the expected date of appearance of brown and black rusts will reduce the intensity of these two rusts. Timely application when these two rusts have just started appearing, will minimise the disease and losses. For complete control of rust 5–6 sprays of the chemical are necessary. Hence it may be cautioned that control of rusts by chemicals is expensive for an average farmer. These chemicals will also reduce losses due to Alternaria leaf blight which is common in eastern U.P., West Bengal, Bihar, Orissa, Gujarat and parts of Peninsular India, when applied a little before boot leaf stage.

Yellow rust cannot be controlled by the available chemicals in the market.

Farmers are advised to grow resistant varieties like Girija, Sonalika etc., in the northern hills and Chhoti Lerma in the southern hills to prevent losses due to rusts not only in their fields, but also in fields in the plains.

3. Loose smut :

Varieties like Kalyansona, PV 18, NP 824 etc. are highly resistant to this disease while Sonalika gets very little infection. The disease incidence can be reduced by (i) growing seed from healthy loose smut free fields (ii) by solar treatment of seed (iii) by hot water treatment of seed or seed treatment with chemicals like Vitavex in the foundation seed.

4. Hill bunt :

Kalyansona and PV 18 are highly resistant to hill bunt which is found only in the northern hills. The disease can be most easily controlled by treating the seed before sowing by Agrosan GN, Thiram etc. given at 2.0 gms /kg of seed (i. e. 0.2%). Copper Carbonate is also effective against this disease.

5. Foot rots :

Caused by species of Helminthosporium, Alternaria can be controlled by treating the seed with Thiram (2 gms/kg of seed) or with a combination of 1.0 gm. of Brassical 1.0 gm. of Thiram to 1 kg of wheat seed. Poor wheat stands caused by foot rots in West Bengal and other warm humid regions can be controlled by the above seed treatment. However, it should be cautioned that these seed treatments should be given when the wheat seed is dry and has a moisture content of not more than 10%. If the chemical is applied to moist seed germination will be affected.

6. For other diseases like Kernal bunt, septoria, Powdery mildew etc., we do not have at present any chemical which is economical to use.

7. Control of nematodes :

Two nematode diseases are impor-

tant in India at present; 1. Molya and 2. Tundu and Ear cockle, both of which arefound only in the north-western part of India. Molya at present can be controlled by treatment of soil with DECP 60% EC. This chemical should be given along with irrigation at water 30 ml/ha given 2-3 weeks prior to sowing. This is expensive. The other alternative is to rotate wheat and barley crops which this nematode parasitises, with other crops which are not affected by this nematode. Deep ploughing at intervals of 10-15 days, given during summer months will help in reducing the nematode population as a result of exposure to the heat of the sun.

Ear Cockle and Tundu are caused by a nematode and a bacterium complex and nematode, respectively. Seed from healthy seed plots or removing of the galls by seiving or by floatation in salt water (they are lighter than healthy seed) and destroying them, greaty reduces losses due to ear cockle and Tundu.

8. Control of pests :

White ants are a serious pest particularly on rainfed wheat. Other pests like army worms, cut worms, stemborers, brown wheat mite, Gujhia weevil or Pyrella bugs become important in some pockets, in some years.

a) White ants (termites) :

Application and working in of 10% BHC at 25 kgs/ha or Aldrin 5% at 25 kgs/ha to the soil after final ploughing and before planking gives good control of white ants. Alternatively seed treatment with aldrin at 400 ml of E.C. per quintal of wheat seed also gives good control. Before application the insecticide should be diluted with five litres of water and the emulsion sprayed over the seed, uniformly spread on floor. The seed should be turned over to ensure proper mixing. The treated seed should be left overnight for drying, before sowing. For the control of termites in the standing crop aldrin 30 EC at 5 litres/ha may be used with irrigation water. This treatment is also effective against the root aphids.

b) *Shootfly* : This pest is common on very early sown or very late sown crop. If wheat is sown in normal time the shootfly damage is less.

c) *Army worm, pyrella and caterpillar* :

BHC 10% at 25 kgs/ha, or spray with carbaryl (Seven 50 WP at 2.5 kgs/ha), Fenitrothion (Folithion 1000 or Sumithion 1000 EC at 500 ml/ha) and, dichlorvos (Nuven 100 EC at 500 ml/ha) will control these pests.

d) *Brown wheat mite, aphids and jassids:* Formothion (Anthio 25 EC at 650 ml/ha), Phosphomedon (Dimecron 100 at 250 ml/ha), dimethoate (Roger 30 EC at 375 ml/ha) and Oxydemeton methyl (Metasystax 25EC at 375 ml/ha) will control all these pests. This spray may be repeated after a fortnight if necessary.

Every farmer should know that except in the case of air borne diseases like the rusts, powdery mildew and kernal bunt, losses due to other diseases, pests and nematodes can be greatly reduced if he takes precautions to observe basic principles of plant

sanitation in his field and with the produce. Destroying infected debris, rogueing of smutted plants, selection of seed from plots free from infection and, a knowledge of chemical control methods which are simple and less expensive, will greatly help him to grow healthy wheat crops.

9. Control of post-harvest losses :

About 10% of the wheat produced in India is lost during and after harvest. Some of the dwarf high yielding varieties have a tendency to shatter their grain when ripe. It is advisable to harvest before the crop is over ripe. All losses in carting, threshing, bagging, transportation and storage should be avoided in view of the present critical food situation. The greatest losses to wheat grains are due to improper storage where due to moisture, heat, rodents and insects, considerable grain is lost. Excellent information is available on storage and storage structures with the extension agencies, which the farmer should utilise to reduce losses of grain, in storage.

It is possible to increase wheat production by 15% over what was achieved in 1972. This is a very modest goal. One has to concede that India has the potentiality and technical know how to substantially increase its wheat production. However, public policies and availability of inputs will greatly influence production.

Input shortages of items like fertliisers, weedicides, pesticides, electricity, diesel, water, etc., will be very much with us for some years to come. Taking into consideration these limitations we have to plan our production strategy. The strategy will be different for different areas depending upon the soil, climate, availability of resources and, enterprise of the farmers themselves. It is difficult to suggest package of production practices that can be uniformly applied for a country of the size of India with its varied soils and climate.

In conclusion, the following points are emphasized :

1. The dwarf high yielding varieties are better than the tall wheats even under low fertility conditions. The response of these dwarf wheats to every kg. of N added is much more than the tall ones.

2. Balanced manuring is important than heavy and unbalanced fertiliser use.

3. A basal application of 5 to 10 tonnes/ha of Farm Yard Manure or compost is beneficial and one can economise on chemical N.

4. Soil tests will greatly help in economising on fertilisers.

5. Application of micro-nutrients like Zinc, Sulphur etc., are necessary wherever they are deficient, to get good yields. Any amount of NPK application does not help if micronutrients are limiting.

6. Split dose of N fertilizer is essential. All P, K and micro-nutrients like Zinc and half of N, should be applied as basal dose. The remaining half of N should be applied as top dress at the time of first irrigation. In sandy soils a further split of N will be beneficial.

7. Drilling of fertilizers, maximises efficiency. Similarly, drill sowing of

seed is most desirable as it helps in better and uniform germination and better stand. Drill sown wheat comes out of the ground earlier.

8. Spread out the fertilizer on a larger area to increase the total production. The law of diminishing returns operates as we increase fertilizer dose to the limited area at the expense of other area.

9. Economy in phosphatic fertilizer use, can be affected if spacing of wheat and root habits of the variety are taken into consideration. Placement of P under close spacing is much more efficient than wider spacing or broad casting.

10. Medium late maturing varieties like Kalyansona, PV 18 should not be planted late and similarly early maturing varieties like Sonalika and Sharabati Sonora should not be planted early.

11. Irrigating the wheat crop at critical stages viz., crown root initiation, jointing, preflowering and dough stages is very important. If one irrigation is available it should be given at crown root initiation stage, if two are available they should be given at crown root initiation and dough stages. Sandy soils require more irrigations.

12. Weeds feed heavily on the nutrients in the field and harm the wheat crop. Eliminate weeds either by hand weeding or by suitableweedicides.

13. Companion cropping of wheat with row crops like sugarcane, potato etc. will increase the total production of the land without any deleterious effects to either of the crops.

14. Only those wheat varieties should be grown which are recommended for a given specific area or conditions. A variety good at one place may not be good at the other place or it may be more susceptible to diseases in the new area. It is better to avoid producers of spurious seed of doubtful quality and purity.

15. There is no difference between Kalyansona and HD 1593. Similarly there is no difference between Sonalika, HD 1553 and RR 21. S 308 should be avoided as it shatters its grain.

16. All precautions and care should be taken to avoid, prevent, eliminate or control the diseases, pests and nematodes which affect the wheat crop. Similarly, all care should be taken to avoid post harvest losses. About 15–20 percent of the total wheat production of India is lost due to all these causes.

TABLE–I

Wheat varieties recommended for Karnataka

State	Varieties suitable for				
	Irrigated conditions			Rainfed	
	Good fertility normal sown conditions	Good fertility late sown conditions	Low fertility normal sown conditions	Low fertility late sown conditions	Remarks
Karnataka	Kalyansona UP-215 UP 301 Chhoti Lerma Safed Lerma Sonalika Malavika*	Sonalika Sharbati Sonara	Kalyansona Hy 65 NI 747–19 NI 5439	Bijaga yellow* Bijaga Red* Amrut* NI 747-19 NI 5439	—

* Durum wheats.

The mighty task that we have undertaken demands the fullest co-operation from the masses of our people. That co-operation cannot come unless we put forward an objective which is acceptable to them and which promises them results.

Jawarharlal Nehru

1. Safflower pays

Border strip:

Safflower, locally called kusum or kardi, is traditionally grown in the drylands for the dye from its yellow or orange petals. But now safflower oil is a more valued produce.

Its cultivation is largely limited to the States of Karnataka, Maharashtra and Madhya Pradesh. But even there it is grown as a border strip around wheat fields or mixed with other rabi crops.

Safflower is considered the most drought-tolerant of oilseeds because of its strong and extensive root system, with the tap root going very deep and making the best of the available soil moisture.

A well-drained soil of medium texture and fertility is preferred for this crop. Shallow or eroded soils produce poorly.

If the soil is of high fertility, more vegetative growth is produced at the sacrifice of seed.

Rainfall:

An annual rainfall of 375 mm is considered enough, but good yields are obtained where the rainfall is higher, about 600 mm.

So far the average yields of the crop are rather low, because it is grown on marginal land and manuring is not common.

The recently evolved varieties are high yielding, and respond well to good management practices. For example, when the Indian Agricultural Research Institute grew the A-300 varety as a second crop after soyabean in Delhi villages, the yield was 10 qtls/ha, and No. 7-13-3, grown in the rabi, unirrigated and on conserved moisture after a fallow kharif, fertilised with 40 kg N and 25 kg. P_2O_5 per ha, yielded upto 30 qtls/ha. This worked out to a net profit of Rs. 2500/ha.

One spray:

Comparatively free from pests and diseases, only one crop needed a prophylactic spray of Rogor at the time of flowering. Other oilseed crops need at least four sprays of aphidicides.

Safflower may therefore be profitably grown as an unirrigated crop in the semi-arid areas

Source: *Farm Fare, Sept. 1974*

2. Rabi pulses preferable to wheat

The rabi pulses-gram, lentil and pea-cannot compete economically with wheat where land and water are not limited in supply. But where water is a limiting factor these pulses score over wheat.

Normally they are grown on rainfed lands where moisture is insufficient for high crop yields.

Factors :

Understandably, the average yield of gram is as low as 6–7 qtl./ha, that of pea 8-9 qtl. and lentil 4–5 qtl.

Several factors contribute to make pulses pay more than wheat when water is in short supply. Their cost of production, for one thing, is very lower.

Their yield potetnial is also very much higher than is usually believed. Their water need is not as sophisticated as that of wheat and production potential per unit supply of water is much higher.

In irrigated lands which normally contains more moisture than dry-lands, rabi pulses mature and yield well with only one or two irrigations.

Trials conducted to bring to the notice of farmers this favourable aspect of pulses by the agronomy division of the Indian Agricultural Research Institute, New Delhi, have more than proved these points.

Results :

The trials were conducted in three seasons. The crops were sown after a pre planting irrigation. It was seen that with this one irrigation the pulses yielded well, if the winter rains were normal.

Now consider a situation in which irrigation water is available for only 1 ha of wheat (4-5 irrigation), but there are 4-5 ha of land to be cropped.

Would it not be more profitable to grow 4-5 ha of gram pea or lentil than raise only one ha of wheat?

Insects :

And under good management, particularly control of insect pests (leaf miner in pea and pod borer in gram, for example), the new varieties of rabi pulses yield pretty well, as the experiments showed.

Many varieties of gram were tested for their yield potential under conditions where moisture was not a limiting factor.

The new varieties Early 53, C–235 and G–130 seem to have a high potential and may prove very profitable in such conditions if properly managed. These grams are capable of producing 4-5 times the average yield farmers usually get.

The popular variety of field pea, T–163 of Uttar Pradesh was found a very good yielder, giving 25–27 qtl/ha of grain.

Provided of course the crop is saved from the ravages of the leaf miner with the use of lindane, and of the pod borer with thiodon 35%. The second pest also attacks gram crops.

Against the average yield of 3-4 qtls

per ha of grain, the lentil crop was found to have a very high yield potential when grown under favourable conditions of soil and moisture.

L-9-12 of Punjab and T-36 of U.P. both yielded more than 30 qtls/ha.

Soil tests :

In the trials conducted at IARI, it was seen that these crops respond well to the application of N and P only on soils of low fertility. The nutrients have to be applied therefore on the basis of soil tests.

It was found that on rich soils, which have more than 30 kgs/ha of available P_2O_5, yields as high as 30 qtls/ha may be obtained without fertiliser provided improved varieties are used and some supplemental irrigations given when necessary.

On poor soils, in which the available P_2O_5 is less than 20 kg/ha, crops show profitable responses to the application of fertilizer. An initial starter dose of N (20-25 kg/ha) was found beneficial.

At the same time, the crops yielded substantially more when given 50 kgs of P_2O_5 as single superphosphate along with N.

Source : Farmfare, September, 1974

3. Does continuous application of fertilizers spoil the soil ?

It has been very well demonstrated in India and elsewhere that fertilizers have contributed a lot in increasing agricultural production. It is said that if the miracle seeds are the catalyst of the green revolution, the fertilizers and fertility management is the thrust behind the green revolution.

Fertilisers are the chemical substances which are added to the soil in order to maintain the fertility of the soil and to compensate the requirement of crop plants for nutrients as well.

Reduction in yield :

Most farmers doubt that soil fertility is adversely affected by continuous application of fertilizers. There are following possibilities due to which yields in certain field may be lowered in the long run.

Continuous use of nitrogen fertilizers alone :

General practice of using nitrogen, leads to the depletion of other two major nutrients i.e., phosphorus and potash in the soil. In the country, the proposed consumption ratio for N:P:K for Fourth Five year plan period was of the order of 4:2:1; but this has not been achieved yet. A few states which are having very bad ratio for N:P:K consumption are given in table 1.

TABLE–1
Statewise N:P:K consumption ratio

State	Ratio N : P : K
Bihar	13 : 2 : 1
Gujarat	16 : 8 : 1
Haryana	29 : 3 : 1
J & K	14 : 3 : 1
Madhya Pradesh	13 : 5 : 1
Punjab	18 : 4 : 1
Rajasthan	15 : 3 : 1
Uttar Pradesh	6 : 1 : 1

Application of nitrogenous fertilisers alone in the intensive cropping systems quickly depletes the supply of phosphorus and potassium which adversely affects the yields after a few years.

2. Micronutrient deficiency in intensive cropping :

The micronutrient deficiency is being accentuated by intensive cropping with high yielding varieties and increased use of NPK fertilizers and inadequacy of FYM. The deficiency of micronutrients like zinc and iron has been reported in Punjab, manganese and molybdenum deficiency in Maharashtra and Gujarat, and boron deficiency in Bihar. Zinc deficiency in U.P. Tarai and Haryana for cereals is well identified. In Rajasthan deficiencies of zinc and iron for sugarcane, gauvo and jowar are quite familiar. In acid soils problems of boron, molybdenum may be quite serious.

Micronutrients play an important role in the reproductive cycle of the crop plants. The responses for the application of zinc sulphate at 20–25 kg/ha. in few states are given in Table-2.

TABLE-2

Response to zinc in qtls/ha.

Crops

State	Wheat	Paddy	Maize
Punjab	4.5	—	7.7
Haryana	5.1	—	—
M.P.	3.1	—	—
Gujarat	3.9	—	—
A. P.	—	5.2	—
U. P.	—	10.6	—

3 Deficiency for secondary nutrients :

Deficiency of sulphur specially for legumes like groundnut, berseem and alfalfa has become critical in Punjab, M.P., Delhi and Haryana. Continuous application of sulphur free fertilisers eg. urea, nitro – phosphates, diammonium phosphate and calcium ammonium nitrate etc., may deplete the sulphur reserve of soil in due course of time. This is specially important in the areas where sulphur is originally deficient in soils. In acid soils of Bihar, M.P., H.P. and Karnataka deficiency of calcium and magnisium has been reported. This reveals that multinutrient deficiencies in these soils begin to affect the yieds.

4. Continuous use of acid producing fertilisers :

In light textured acidic soils, use of acid producing fertilizers like ammonium chloride and ammonium sulpate etc. is detrimental due to the fact that they add to the acidity of the soil and restrict the growth of crop plants. Acid equivalent of some of the fertilizers is given in Table-3.

TABLE-3

Acid equivalent* of fertilisers

Fertiliser	Acid equivalent (kg.)
Am. chloride	128
Am. sulphate	110
Am. phosphate	86
Urea	80
Am. sulphate nitrate	93
Am. Nitrate	60

Acid equivalent* : refers to the kgs. of calcium carbonate required to counteract the amount of acid produced by the use of 100 kgs. of fertilizers.

The caution, therefore, needs to be exercised in using these fertilizers specially in light textured soils. Selection of proper fertilizer materials in these soils is very important and periodic addition of amendments may be advisable in extreme cases.

Excessive use of phosphatic fertilizers and micro-nutrient carriers with out need :

Application of phosphatic fertilizers in excess amount leads to the decrease in the uptake of some nutrients like zinc and iron. Moreover, the use of micronutrient fertilizers without need may cause toxicity in plants. Similarly addition of certain nutrients without need also results in reduced availability and uptake of some other nutrients. For example iron and manganese, calcium and potassium and ammonium are known to be antagonistic to each other. Such factors may adversely affect the yield of crops.

Build up of insect-pests and pathogens :

Sometimes with application of fertilizers crop growth is quite good for few years but build up disease inoculum or insect population hampers the possibility of obtaining higher yields in subsequent years. Due to misunderstanding such reduction in yield may be attributed to the continuous use of fertilizers.

Residual effect of fertilizers :

How much residual effect of fertilizer applied to previous crop will benefit the succeeding crop is an important question of every farmer. But in India, certain farmers are misinformed that application of fertilizer once like organic manures, has its residual effect for next 3 or 2 crops and they don't add fertilizers in the succeeding crop which results in lower yields. Studies reveal that most of the nutrients in Indian soils are deficient and their residual effects are not of much significance for practical purposes. However, where the phosphorus and organic manure application is continued over longer number of years, the build-up residual effect is measurable. Phosphorus particularly has more residual effect than any other fertilizer nutrient.

Precautions in fertilizer use .

To get the better use of fertilizers for higher crop yields and sustained good-soil-health following points need to be observed :

Soil testing :

The quantity of fertilizer recommended for use must be related to the requirement for each crop and status of the soil. Therefore, soil should be got tested first and then the required amount of fertilizer applied on the basis of soil tests. This ensures balanced use of nutrients and, too little, too much or disproportionate application of nutrients is avoided. This not only results in higher yields but ensures maximum profit.

Addition of secondary nutrients :

Fertilizers containing sulphur shall be used wherever deficiency of this element has been observed. In acid soils calcium and magnesium should be maintained at the optimum level.

In addition to nitrogenous, phosphatic and potassic fertilizers, micronutrient fertilizers should be used wherever necessary. Special care should be

taken for the availability of boron and molybdenum in acidic soils and iron, zinc and manganese in alkaline soils. Phosphate rich calcareous soils may show zinc problems.

Selection of proper fertilizers:

Depending upon the soil characteristics and nature of the crop proper fertilizer should be applied. For example, in case of acid soils application of acid producing fertilizers like ammonium sulphate, ammonium chloride etc., should be avoided. Similarly, basic fertilizers should not be used on alkaline soils.

Improvement in soil structure:

In black and alluvial soils deep ploughing has been found to be the most efficient method in improving the soil structure. Application of organic manures in quantities exceeding 20 tons/ha.,and wherever necessary, combined with gypsum, has been found to be the most effective for the purpose of maintaining good soil structure.

Proper rotation:

As far as possible same rotation should not be repeated every year. To some extent this will take care of excessive built-up of pathogens and insects in soil.

Proper management:

To achieve the maximum profit from fertilizer application with high yielding varieties a due consideration should be given for:

i. Irrigation at an appropriate time and in optimum amounts.

ii. Removal of weeds.

iii. Application of fungicides and other pesticides to control diseases and pest attack.

iv. Spacing and plant population etc.

Thus, if fertilizers are applied in judicious amounts along with the care of other factors which are responsible for lower yields, their continuous application does not spoil the soil health and helps in sustaining higher crop production.

Source: Farmer and Parliament, April, 1974

4. Rout those rice - field rats

Their chisel-like front teeth are forever nibbling, all through their waking hours. That is how they can eat up more than 25 grams of grain a day, while themselves weighing only 30 to 100 grams.

Who else can they be but the rice-field rats?

Rice-field rats have a special liking for rice plants and its grains and other grain and riot crops. They prefer water-logged fields and fields under vegetables.

Though they breed throughout the year where food, shelter and climate are congenial, in the field they tend to multiply faster during rainy season, when natural foods are in plenty.

During this period, they can reproduce very fast. Each pair will be responsible for at least two dozen rats that grow up to destroy your crop.

Presently poison baiting, trapping and predation are being used to control rats. But none of them would give lasting results. They can, at best bring down the population for the time being. The population explosion follows once

such control operations stop.

This is so because when the rat population is high, there is a struggle for existence. So they eat anything that come their way and fall a prey to baits and trappings. That is why control measure is effective when population is high.

For the most effective control, rat population build-up has to be checked. This can be done through keeping your field clean. Constant weeding of paddy fields, bunds and surroundings is more effective than poison baiting in a weedy field. You can kill rats with baits but you can stop their unchecked breeding only if you keep your field clean.

Israel has set a good example in permanent rat control through eradication of weeds as soon as they appear.

No food, no shelter :

Perhaps it is hard to keep the rats away during booting and maturing stages. But you can check them from becoming permanent settlers in the field by strictly following the cultural practices and field sanitation. In fact 'weed hatao' campaign must start quite early. The weeds and rubbish from sorrounding areas can best be used to make compost.

Operation rat control :

Any operation against rats can be successful only when it is done systamatically and covers a large area, including the untilled lands. This means that all the farmers in an area must take it up jointly and in right earnest.

Secondly, you have to wage the war off and on. Usually farmers in areas launch campaigns against rats when the menace is at its height. This only gives temporary relief. If the operation as so often happens, is discontinued, the rats come back in full force.

Poison baits :

The most commonly used method for controlling rats is by baiting with poison. Poison mixed with the food and left in their burrows or their trails. But the rats seldom eat their food in the same setting. That's why poisoning sometimes fails.

A number of poisons are available for baiting. Warfarin and zinc phosphide are most commonly used. The latter, a dark and pungent material, is being more and more used in the fields. It is less dangerous to other living things than many poisons currently in use. It turns harmless after few a day's exposure.

Here is how you make zinc phosphide bait. Mix three parts by weight of zinc phosphide with 97 parts by weight of food material.

Soak the grain in water for a few hours. Drain out the water thoroughly and put the grain in an earthen pot. Mix small quantity of vegetable oil or mineral oil (one percent of the weight of the soaked grain). For mixing, use a long handled spoon. Keep the hands covered by wearing rubber gloves. Don't forget that you are handling poison.

In case you are using flour for preparing baits, mix the required quantities of zinc phosphide and the flour with a long handled spoon. Add water to the mixture to make it moist

and sticky. Make small balls of the size of pea and allow them to dry in shade. Use only freshly made poison baits. About seven or eight gm will be sufficient for each hole.

Locate the Rats :

Look out for rats and rat signs. Burrows, runways, droppings and footprints on rat trails are good indicators.

These fearless creatures mostly move about in a fixed trail. Those will be mostly along the paddy bunds. You may see criss-crossed runs in places overgrown with weeds, which may be linked by one or a few main runways to feeding areas.

Pre-baiting :

Pre-baiting is to familiarize rats to the baits. Usually, the rats eat 10 gms of grain per night. The amount consumed, therefore, during night can help you estimate the rat population. If pre-baiting proves too costly, you can skip it. Place zinc phosphide baits, 7 to 10 cm inside the burrows. Don't put your hand into it. Wrap the poison bait in a small piece of paper and throw it inside the burrow. After placing the bait, place a little trash or leaves at the opening of the burrow. Close it with soil.

In Philippines, a bamboo baiting tube is recommended for baiting. They are kept along the paddy bunds 10 metres apart.

Instead of baits you can introduce poisonous dust into the rat holes any time of the day if there is high moisture in the air. Otherwise, do it in the early hours. All openings of gassed burrows must be covered with soil. Never do it on a windy day.

After the operation, check for rat signs like active burrows, runways and fresh droppings.

Once the place is cleared of rats, keep it clean. Make regular inspections. You can keep your field free from rats, if you use rat baits with always an eye on keeping the fields and bunds clean.

Source : Intensive Agriculture, July 1974

I. Soaking of castor in water promotes germination

Castor seeds due to the hard seed coat take a longer time to germinate compared to other seeds and the review indicates that certain seed treatment practices such as soaking in water, seed abrasion etc., help in hastening germination.

Pot culture studies on the germination of castor seeds done at agricultural College, Dharwar during January, 1969 included the following treatments: i) Seed soaking for 24 hours in water, ii) Cattle urine, iii) 24% urea solution, iv) Complete removal of seed cost, v) Partial abrasion at the basal end of the seed and vi) Control and these were replicated thrice.

Results indicated that seeds soaked in cattle urine and those received injuries by way of complete removal of seed coat and partial abrasion at the basal end did not germinate while seeds soaked in water, germinated in about eight days i.e., three days earlier than control or seeds soaked in urea solution. The water soaking treatment besides hastening germination was found to give about 80% germination which was 20%, more than control and soaking in urea respectively. The germination in control treatment was 50%. These results confirm the observation made by earlier workers.

2. Paddy cultures CR-10-4181-1, RP-5-17, RP-5-2, Sigadis, Intan, IR-618 and MR-81 are resistant to blast reaction throughout the plant period.

Since paddy is prone to blast infection at seedling, tillering, flowering, neck and nodal infections, it has become necessary to screen the varieties to blast disease at all the stages of the crop growth in order to get a true resistant variety for all these stages.

To compare relationship of leaf blast under nursery and in transplanted conditions with neck and nodal blast reaction and to screen out the truely resistant entries, this experiment was taken up with 163 cultures. Two sets of seeds were sown, one to screen for seedling resistance and another for transplanting and to score the transplanted crop for adult plant resistance.

To evaluate at nursery stage 163 entries were sown at the Agricultural Research Station, Ponnampet on 17-8-1973 following 'Uniform blast nursery' technique an international method wherein the test entries were sown in one metre row which flanked by the susceptible varieties to extend maximum opportunity for the pathogen to develop and to infect the plants. The susceptible variety used in this experiment was 356 a local susceptible tall variety and Pusa 2-21 a dwarf variety which is highly susceptible for

blast. When the crop was 45 days old the susceptible checks were completely affected by blast. Scoring made on the test entries revealed that only 15 entries bear resistance to blast. Another set of seedlings earmarked to see the adult plant reaction was transplanted on 27-7-73, each culture in 2 metre long rows and flanked by Pusa 2-21 and KB-356 on either side with 15 cm between plants and 25 cm between rows. The scoring was done at all the susceptible stages of the crop grown, taking reading of the leaf blast on 1-7 scale under nursery conditions and of transplanted plants upto booting. For neck blast the scale used was 1-7 representing 0–100 neck infection on percentage basis.

The reaction of the cultures was quite interesting. Observations indicate that some cultures which showed resistant reaction in the nursery showed susceptible reaction in the later stages, particularly neck and the cultures which showed susceptible reaction in the nursery showed resistant reaction in the later stages and a few other cultures showed susceptible reaction in both the stages and still a few more, showed resistant reaction throughout the plant period. Out of 214 cultures only seven entries–1) CR 10-4181-1, 2) RP 5-17, 3) RP 5-2 4) Sigadis, 5) Intan, 6) IR-618 and 7) MR-81 were found to be resistant to reaction of blast both in nursery and in mature plants.

3. Mixed cropping of chillies with Varalaxmi, Hybrid-4 and Bhagya is highly profitable:

Mixed cropping of chillies with cotton is the common practice in the North Karnataka. Chillies is transplanted in the month of June-July and cotton is dibbled one way in between the chillies hills in August–September. In order to find out the performance of recently released cotton hybrids (Varalaxmi and Hybrid-4) and variety (Bhagya) in mixed cropping with chillies, studies were made at Agricultural College Farm, Dharwar, during the year 1973–74.

The trial was carried out in student plots. Each student planted 3 lines of Varalaxmi, 3 lines of hybrid-4 and 4 lines of Bhagya in chillies in a plot 1/25th of an hectare. The spacing for chillies was 90 cm. x 90 cm. The chillies were planted in the middle of June and cotton in the middle of August one way in between two chillies hills. The fertilizer was applied in three doses. The first dose of 60 N, 40 P_2O_5 and 20 K_2O kg. per ha in the middle of June to chillies in the form of ring and the second dose of 40 N, 40 P_2O_5 and 20 K_2O kg/ha was applied in the middle of August to both chillies and cotton in the form of band. In all, three irrigations were given i.e., at peak flowering, boll formation and at boll opening (first week of November, December and January, respectively). Before giving first irrigation, third dose of fertiliser (20 kg/ha nitrogen alone) common to both chillies and cotton was applied in the form of band. About 10 sprayings common to chillies and cotton were covered through 1% urea. These sprayings were done at 15 days interval starting from September to January. The data obtained was subjected to statistical analysis as Randomised Block design taking each plot as a

replication.

The results obtained in this study are presented in Table-1. Hybrid Varalaxmi (2300 kg/ha) gave the highest yield of seed cotton followed by Hybrid-4 (1025 kg/ha) and Bhagya (725 kg/ha). Ramanagowda (1974) also found that the Varalaxmi recorded the highest yield of cotton when compared to Hybrid-4 and varieties (Laxmi and J. K. 67). Katarki (1972) observed that Varalaxmi gave enhanced yield of seed cotton by 67% over Hybrid-4. This high yeilding ability of hybrid Varalaxmi may be due to better plant type and hybrid vigour.

The yield of chillies, however, was the highest in Bhagya lines (933 kg/ha) followed by that in Hybrid-4 lines (558 kg per ha) and Varalaxmi lines (400 kg per ha). This indicates that the crop of chillies was suppressed because of more rapid and vigorous growth of hybrid cottons.

The highest monetary return was obtained with mixed cropping of chillies and Varalaxmi (Rs 19,885 /ha) followed by mixed crop of chillies and Hybrid-4 (Rs. 6,417/ha) and chillies and Bhagya (Rs. 5,317). The higher income with mixed cropping of chillies and Varalaxmi was due to high yields and high market price for Varalaxmi cotton.

TABLE-1

Performance of cotton hybrids and variety as mixed crop with chillies under protective irrigation

Treatments	Yield kg/ha Cotton	Yield kg/ha Chilli	Gross income Rs./ha Cotton	Gross income Rs./ha Chilli	Total gross income Rs./ha	Cost of cultivation Rs./ha	Net return Rs./ha	Net return per rupee spent
Varalaxmi+Chillies	2300	400	20,585/-	1,800/-	22,385/-	2,500/-	19,885/-	7.95
Hybrid-4+Chillies	1025	558	6,406/-	2,511/-	8,917/-	2,500/-	6,417/-	2.51
Bhagya+Chillies	725	933	3,443/-	4,198/-	7,642/-	2,325/-	5,317/-	2.29
C. D. at 1%	187	81						

Varalaxmi cotton is sold at the rate of Rs. 895/- per Q.
Hybrid-4 cotton is sold at the rate of Rs. 625/- per Q.
Bhagya cotton is sold at the rate of Rs. 475/- per Q.
Byadagi cotton is sold at the rate of Rs. 450/- per Q.

4. Power tillers vs bullock power for seed bed preparation :

In the process of mechanisation many machines are being used on the farms. In addition to helping to get increased yields, the use of machinery reduces labour and drudgery involved in the farming operations. In India the size of land holdings is generally small and the high cost of machinery has made mechanisation a controversial issue.

Small two-wheeled tractors commonly known as power tillers ranging between 5 and 10 H.P. constitute a suitable power unit for small land holdings. It is attractive even to small farmers. To know the superiority or

otherwise of power tillers over the bullock power for seed-bed preparation in red and black soils, the present study was taken up. The following experiments were conducted at the Regional Research Station, Dharwar during the year 1968-69 and 1969-70. The two treatments followed for comparison were:

1. Use of bullock power and its associated implements and use of power tiller and its associated implements.

Experiment No. 1: This experiment was conducted during the rabi season of 1968–69 for growing maize under irrigated conditions in the red soil. The study was restricted to the primary tillage operations for preparing the seed bed. The size of the plot selected was 20 metres x 20 metres and there were four replications for each one of the treatments. The various types of operations done in the seed-bed preparations in the two treatments are given in table–I. The time and labour required and yield obtained from each treatment are given in table–II.

Experiment No. 2: Experiments similar to those conducted in the red soil were repeated for the preparation of seed bed in the black soil during the kharif season of 1969-70 for growing groundnut under rainfed conditions, types of operations done for the seed bed preparation, the time required and the number of man-hours used for the two treatments and the yields obtained are given in table–III.

In these experiments the power tiller of 8–10 H.P. was used. The subsequent operations like planting, intercultivation, manuring, sowing, harvesting, etc., were identical in both the cases.

From Table-I it is seen that the number of different operations required for seed-bed preparation in the red soil was 6 for bullock power and only 2 for power tiller leaving out ploughing which is common for both the treatments. In the case of black soil, the the number of operations for bullock power was equal to the operations required for a power tiller to get the same results.

From Table-II it is clear that the time required for bullock power was 90 hrs./ha whereas it was found to be 87.5 hrs/ha for power tiller which does not show a very significant difference. But in the labour units required, it is found to be 300 man hrs/ha for bullock power and only 237.5 man hrs/ha for power tiller which gives a saving of 20.5% in the case of power tiller. With regard to the cost it is found to be only Rs. 175/- for bullock power where as it is Rs. 268/- for power tiller. This means that the cost of working for power tiller is 53.1% more than to bullock power, for preparing the seed-bed in red soil.

From Table-III, it is seen that the time required to prepare the seed-bed in black soil is not very much different for both the treatments. The cost of bullock power is only Rs.81.25 as against Rs.154-00 for power tiller in the case of black soil which shows that there will be an increase of 89.5% in cost when power tiller is used for dry cultivation in black soil. Again it is noticed that there is no significant difference in the yields of the crop in black soils.

From the above discussion it is seen bullock power has an edge over the power tiller in regard to cost of seed bed preparation in black and red soils.

TABLE–1

Types and number of tillage operations

Type of soil	Type of tillage operation	Bullock power Implements used	No. of times used	Power tiller Implements used	No. of time used
Red	Ploughing	M. B. Plough	1	M. B. plough	1
	Harrowing	Disc harrow	2		
		Wooden plank	2		
		Blade harrow	2		
	Dry tilling			Rotovator	2
Black	Ploughing	M. B. ploughing	1	M. B. plough	2
	Horrowing	Blade harrow	2		
	Dry tilling			Rotovator	2

TABLE–II

Average time, labour, cost of seed-bed preparation and yields for red soils (1969)

Type of power used in seed–bed preparation	Type of tillage operation	Time for land prepa–ration hr/ha	Labour units in man hr/ha	Total no. of operations in seed–bed preparation	Cost of seed bed prepara-tion Rs.	Yield in kg/l Grain	fodd
Bullock power	Maize	90	300	7	175–00	500	1571.
Power tiller	Maize	87.5	237.5	3	268–00	487	1651.

TABLE–III

Average time, labour, cost of seed-bed preparation and yields for black soils (1970)

Type of power used in seed-bed preparation	Crop grown	Time for land prepa-ration hr/ha	Labour units in man hr/ha	Total no. of operations in seed–bed preparation	Cost of seed–bed prepa-ration Rs.	Yield in kg/ha
Bullock power	G. nut	58.5	100	3	81.25	1575
Power tiller	G. nut	57	62.5	3	154.00	1591

Source : Current Research, September 15, 1974, U. A. S. Hebbal, Bangalore

VII News in brief

1. Gramsevaks :

The recent survey of effective role played by the Gramsevaks in the agricultural development indicates that out of a total of 3,680 Gramsevaks, 985 posts are vacant, at present; and that as many as 135 gramsevaks, are not staying in headquarters and further that out of those who are staying in headquarters as many as 22 are not effective in discharging their work satisfactorily.

2. Netherlands tops in Potatoes :

According to the production year Book, 1972, the Netherlands has the best per hectare yield of potato, 316,000kg. Next comes West Germany with 256,000 kg.

Following are Sweden 247,000 kg. Britain 243,000 U.S.A., 235,000kg, France 197,000 kg, Japan 174,000 kg, Poland 169,000 kg. U.S.S.R. 105,000 kg, Sri Lanka 118,000 kg, India 85,000 kg and Pakistan 83,000 kg.

3. Fertiliser samples analysed :

As against 194 fertiliser samples received, 114 samples were analysed. Out of this 34 samples, were found substandard. Out of these 34 samples, 33 were mixtures and 1 was C.A.N. 48 lime samples were analysed as against 49 samples received. In addition to this an equal number of Gypsum samples were also analysed. The number of compost samples analysed was 120 as against 231 samples received.

4. G.B. Pant University invites applications :

Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (U.P) invites applications for the posts of Professors, Associate Professors, Asst. Professors, Instructors in the different fields of Agriculture. The scales of pay of the posts are Rs.1100-2500 for Professors, Rs.700/-1250 for Associate Professors, Rs.400-950 for Asst. Professors and Rs.300-550 for Instructors. The last date for submission of application is 30.11.74. Any other details in this regard may be obtained from the Directorate of Agriculture, Bangalore.

5. New strain Wheat :

An entirely new strain of wheat called triticale may soon help to solve the world's food shortage.

Triticale, which combines the best of wheat and rye has an added advantage of higher protein content, according to World Bank experts.

The plant has a shorter stalk and can give double the yield.

It can be grown on high grounds and is not so vulnerable to bad weather.

It is now being distributed worldwide and is on the verge of becoming a commercial crop.

It can be turned into acceptable western - style bread and Indian chapatis.

Hungary started making a rye-type 'triticale' bread in 1968. Canada and

Spain have been using it since 1970 and Argentina and the United States have developed it as a fodder crop.

According to Dr. M. S. Swaminathan, Director-General of the Indian Council of Agricultural Research, several strains of triticale, which is a cross between wheat and rye have been developed in agricultural centres in India since 1950.

Recently, intensive tests have been carried out under the All-India Co-ordinated Wheat Programme on Triticale Strains both Indian and exotic, especially those from Mexico.

Results assessed by the Indian experts have shown that in the central Himalayas some triticale varieties have proved to be of promise, both in yield and grain weight which were the drawbacks in the earlier strains of this hybrid cereal. Protein content of the varieties being tested in India is calculated to vary between 9 and 15%.

The International Development Research Centre of Canada (IDRC) has given 400,000 dollars for a triticale research and development project in the Himalayan region.

No triticale strains have been commercially released yet in India, but intensive tests are being carried on in the Indian Agricultural Research Institute, at New Delhi and the Pantnagar and Jabalpur Agricultural Universities.

Triticale was developed in 1875 by a Scottish plant breeder named Wilson.

VIII DEPARTMENTAL NEWS

a) Director's Tour

The Director of Agriculture was in Mandya on 5-9-74 and reviewed the work at the Rural Development Training Centre and at the I.J.A.E.T.C He was in Hunsur, K. R. Nagar and Mysore on 6-9-74, where he visited Tobacco Research Station, reviewed the agricultural programmes and visited Bilikere Project taken up jointly by the University of Agricultural Sciences and Department of Agriculture respectively. He was in Pandavapura and Nelamangala on 7-9-74 and inspected the soil conservation works and reviewed the block programmes respectively. He went to Bellary on 10-9-74 and attended the meeting convened by the Divisional Commissioner with regard to the Development of Thungabhadra Project area, where he also reviewed the progress of land development works under T.R.B.C. He paid a surprise visit to the Office of the Assistant Director of Agriculture, Kudligi and Seed Farm, Gundinahole on 11-9-74 and also inspected the Agricultural School and Farm at Kampli. He held discussions with the departmental officers at Bellary with regard to Rabi/Summer programme. He inspected Varalaxmi Cotton Crop at Devinagar on 12-9-74 grown over on an area of 100 acres. He visited the Agricultural Research Station at Siruguppa and the Soil Testing Laboratory at Dhadesugur. He proceeded to Gangavathi on 13-9-74 where he inspected Rural Development Training Centre and the Farmers Training Centre. He was in Harihar on 14-9-74 where he inspected block demonstration plots taken up jointly by the Department of Agriculture, Mangala and University of Agricultural Sciences and later proceeded to Shimoga where he held discussions with Deputy Commissioner with regard to Agricultural production programmes of the district. He paid a surprise visit to the office of the Assistant Director of Agriculture, Doddaballapur and Deputy Director of Agriculture (IDLAD) on 24-9-74 and reviewed the progress of work.

b) Promotions and transfers : *Nil.*

c) Schemes : *Nil.*

d) Publications, Extension materials and radio talks :

Fortnightly seasonal tips for the benefit of the farmers in the State for the month of October, 1974 were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various local dailies for publication. The same was also sent to the All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at

Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this news of agricultural importance were collected and sent to All Ihdia Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'. The following radio talks were also arranged.

1. A dialogue on the results of mass demonstrations on efficient use of fertilizers.

By C. T. Muthanna
Asst. Director of Agriculture
(Information)
Broadcast on 7-10-74

2. A dialogue on wheat cultivation–Package of Practices of Mexican Wheat.

By D. Srikanta Rao
Agricultural Officer
(Farm Radio)
Broadcast on 1-10-74,

farm front

Volume-8 December 1974 No. 12

FARM ADVISORY AND EXTENSION SERVICES

KSDA

KARNATAKA STATE
DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

Cover :

December to middle of January is the peak harvesting period for paddy in most parts of Karnataka. There is much activity in the fields and in threshing yards. Farmers look forward to this period with all hopes of a bountiful harvest.

DIRECTOR'S PAGE

The State had set on a task of producing 64 lakh tonnes of foodgrains during the current year. This was to be made up of a kharif production of 49 lakh tonnes and the balance of 15 lakh tonnes from rabi and summer production. The main strategy consisted of an expansion of area under high yielding varieties along with the adoption of their production technologies.

Although the early kharif rains started well in the South Western districts, this was unfortunately followed by an unusually long break which not only seriously affected the sown crops but greatly hampered the sowing operations over the entire midlate and late kharif areas. Good rains, still inadequate, came towards end of July and in August, improving the situation to a great extent and reviving the hopes of near normal production especially of Paddy and Ragi. This was further helped by good rains in September and October, throughout the State, reassuring the earlier hopes and promising a brighter prospect for rabi and summer production.

The net result has been a dip in the kharif production to an extent of approximately 6 lakh tonnes. A brief review of the achievements of the High Yielding Varieties programme is given elsewhere in this issue. Groundnut is another crop whose production is feared to have come down by about 25%.

Fortunately for us, the good rains received during September and October and to some extent in November have provided a good opportunity for launching a big drive for boosting agricultural production during Rabi and Summer and to substantially making good the shortfall in kharif production.

Based on the feasibility in different districts, revised targets have now been set for Rabi and Summer in the recent meeting of Deputy Directors of Agriculture and Joint Directors of Agriculture. As against the original target of 14. 87 lakh tonnes, the revised target is 19. 11 lakh tonnes, thus aiming at an additional target of 4. 24 lakh tonnes. It is now upto the Joint Directors and the Deputy Directors to launch a vigorous drive to see that the resources available at their disposal are fully exploited to reach the goals. Separately, the Divisional Commissioners and Deputy Commissioners have been requested to ensure the needed assistance from the Block agencies and to spare no efforts in reaching the goals.

The main emphasis should be on increasing the area under

the High Yielding Varieties Programme. The irrigation facilities available under the major, medium and minor irrigation projects including irrigation wells should be fully exploited. Also, educational efforts should be intensified regarding efficient use of fertilizers which has already yielded excellent results wherever tried. Large scale association of farmers and village institutions will yield ample dividends.

The State will still be short by about 2 lakh tonnes of foodgrains as against the original target of 64 lakh tonnes for the whole year. However, considering the unfavourable weather situation which was prevailing during the kharif season, this should be considered a good performance.

It is encouraging to know that in many of the districts the Rabi programme has made a good impact and the preparation for summer season is brisk and enthusiastic.

R. Dwarakinath
Director of Agriculture

II The month in retrospect

(Seasonal and crop conditions during October, 1974)

Fairly good showers were received in almost all the districts. These showers while ensuring the sowing of rabi crops throughout the State especially in the northern districts have brightened the prospects of rabi/summer crops.

Bangalore Division:

Good showers were received in Bangalore, Kolar, Tumkur, Shimoga and Chitradurga districts helping the standing kharif crops to a great extent. Important agricultural operations carried out were harvesting of dry land paddy, ragi, bajra, jowar, maize and sunflower, picking of sea island cotton, interculturing and top dressing of high yielding paddy, preparatory cultivation operations for sowing of rabi crops. Blast, stemborer, leaf roller and gallfly on paddy, aphids, bollworms and jassids on cotton were noticed against which necessary plant protection measures were taken up.

Mysore division:

Widespread rains were received in Mysore, Mandya and Hassan, whereas fairly good showers were received in Chickmagalur, South Kanara and Coorg districts. Harvesting of ground nut, hybrid jowar, ragi, sunflower and maize, intercultivation in paddy fields, sowing of rabi crops like wheat, jowar, bengalgram, preparatory cultivation for raising rabi paddy were some of the major agricultural operations carried out. Blast, stemborer, case worm on paddy were noticed. Necessary plant protection measures were taken up.

Dharwar division:

Fairly good rains were received in Dharwar and North Kanara districts. Agricultural operations like harvesting of hybrid jowar, paddy, groundnut, sowing of wheat, rabi jowar, gram and safflower and weeding and interculturing in cotton were carried out. Cut worms on paddy, earhead pests on kharif jowar, bollworms on cotton were noticed for which necessary plant protection measures were taken up.

Belgaum division:

There was good rainfall in the districts of Belgaum and Bijapur which brightened the prospects of rabi crops. Sowing of rabi crops like wheat, jowar, maize, and sunflower, harvesting of minor millets, paddy, hybrid jowar, sugarcane, potato and groundnut were some of the major agricultural operations carried out. Aphids, leaf eating caterpillars on tobacco, and bollworms on cotton were noticed. Necessary control measures were taken up to check the further spread of pest attack.

Raichur division:

Heavy rains were received in Raichur district, where as fairly good

showers were received in Bellary district. Important agricultural operations carried out were harvesting of hybrid jowar, hybrid bajra, sowing of rabi jowar, safflower, sunflower and bengal gram and weeding and top dressing of paddy. Bollworms on cotton, leaf blight on paddy, ergot on bajra were noticed against which necessary plant protection measures were taken up.

Gulbarga divison :

Fairly good showers were received in the districts of Gulbarga and Bidar districts. Harvesting of hybrid jowar, paddy and kharif jowar and sowing of rabi crops were carried out. Jassids, mites, bollworms and leaf spot on cotton, leaf miner and aphids on groundnut were noticed. Necessary plant protection measures were taken up.

III INPUTS FOR FARMERS

Fertilizers

The Government of India have allotted 94250 tonnes of N to Karnataka for Rabi 74–75. Against this allotment, 26,000 tonnes of N have been supplied so far. Poor supplies are due to the shut down of M.F.L. Factory, S.P.I.C. not going into production so far, FACT facing transport bottlenecks for the movement of stocks from Cochin and E.I.D. Parry facing the power cut imposed by Tamilnadu Government. The Goverment of India on repeated representations made by the State Government in this regard have allotted 4840 tonnes of N (2000 tonnes from Zuaris, and 2840 tonnes from F.C.I. Trombay) to compensate for the short supplies in respect of the above firms.

Card system :

The distribution of fertilisers in the State has been streamlined and the card system is working satisfactorily. So far, about 17 lakh of cards have been distributed to the farmers against 24 lakh cards supplied. The drive for the supply of cards to the remaining farmers is being intensified.

To make the system "Fool Proof", it is proposed to note both the eligibility and supplies made on page No. 8 of the card, with the convertion tables of Nutrient content in each type of fertiliser, printed on the back side of it. Further, to put down malpractices in the distribution, the Department is launching an intensive drive, to check the veracity of the cards, and also the entries about the supplies, in the registers maintained by the dealers.

Revised policy :

Salient features of the revised policy of fertilizer distribution consists of (a) equitable distribution of fertilizers to all the farmers without discrimination, on cards, (b) fixation of district-wise quota of fertilizers tagging on each manufacturer to each district, (c) supply of full dose of fertilizers to important crops (which are highly responsive to fertilizer application) like Hybrids, High Yielding crops, tuber crops, vegetables etc., (d) relaxation of restrictions on the supply of fertilizer by the the dealers who can straightaway distribute fertilizers against cards to the farmers, on receipt of stocks from the manufacturers and (e) tagging on the farmers to 3 dealears so as to ensure that choice is given to him to

draw the supplies from any of them.

Fertiliser off take up by 15 to 20% :

The above policy has paid rich dividends, in that, many of the malpractices prevalent in the permit system of distribution have been eliminated. The dealers and farmers are happy about the new arrangements. The State Government has been able to supply fertilisers to the farmers in time and smoothly. Further as a result of this policy, the consumption of fertilisers in the State has gone up by 15 to 20% this year over the last year's cosumption as against a national trend of a decline in fertiliser off take to an extent of 30 to 33%.

Straight fertilizers for top dressing :

Arrangements have been made to provide straight fertilizers for top dressing on request.

Pockets of Scarcity :

Special attention is paid to pockets of scarcity by diverting stocks from areas where the stock is considered excess.

Stock Position Satisfactory :

The State has about 6000 distribution points for the supply of fertilisers and the present stock position of fertilisers can be considered satisfactory.

IV ARTICLES

Rabi and Summer Rices

S. V. Shastry, Project Co-ordinator (Rice), All India Co-ordinated Rice Improvement Project, Rajendranagar, Hyderabad-500030, A.P.

The author calls basal application of fertilisers a luxury and advocates skipping of the same. For excellent results, he recommends instead a closer spacing with 1-2 seedlings per hill and a single top dressing of approximately 40-50 kg. N/ha. about 30-40 days after planting.

Rice production programs of kharif 1974 faced several problems - drought, energy crisis, escalation in cost of agro-chemicals, shortage in supply of fertilisers, floods etc. It is feared that the production would drop below the previous year's level, at a time when the demand is even greater, when this commodity is nationally and internationally scarce and when the prospects for increased wheat production within the country appears bleak. This situation leaves no other alternative than to make up the shortfall during Rabi and Summer seasons. The performance of high yielding varieties is also distinctly better in rabi and summer seasons and experiences less problems with the pests, diseases and water management. An attempt is, therefore, made to list out the opportunities for stepping up the rice production in the low-risk and high-productive seasons.

Areas of production and their problems :

The climate of Uttar Pradesh, Bihar and Assam permits the cultivation of rice only in summer season (February-July) but not in Rabi. Extensive Rabi (November-April) cultivation of rice is practiced in West Bengal, Orissa, Andhra Pradesh, Tamil Nadu and Karnataka, where the growing season is referred to as - boro, dalua, tabi, navarai etc. Relatively less area exists in Maharashtra and Kerala. The canal systems from the Krishna and Godavari river in Andhra Pradesh ; the Thungabhadra in Karnataka; Hirakud and Kosi Projects in Orissa, and Bihar provide the flow irrigation for rice. Other areas rely upon tanks, wells, shallow tubewells, etc. Water, being the most limiting input, all efforts should be made to maximize its efficiency.

Planting of Rabi and Summer rice synchronizes with cool weather, while the ripening stage experiences hot weather in Rabi rice and cloudy weather in summer rice. Yields of Rabi rice could be substantially

improved by advancing the time of planting and of summer rice by curtailing the duration of the varieties chosen, so that ripening period skips excessive warm and overcast weather, which bring down the yields. Some experience exists in this regard from Andhra Pradesh and Bihar. In Andhra Pradesh, the early dalua campaign which advanced the rice plantings from February to December, led to significant yield increase (Table I). In Bihar, the variety IR-8 known to be higher in yield potential and longer in duration than T N 1 and Padma indeed gives lower yield in summer crop season (Table-2). Additional problem of summer crop is the uncertainity and inadequacy of irrigation during tillering phase, which lowers the efficiency of fertilisers and reduces tillering which is so strongly correlated to yield.

TABLE-I

Productivity of early ond late planted Rabi rice

Year	Early	Late	Increased yield due to early planting (tons/ha)
1968	1.94	1.77	0.17
1969	2.32	1.88	0.44
1970	2.34	1.72	0.62
1971	1.93	1.43	0.50
1972	2.23	1.28	0.95
1973	3.27	1.73	1.54

Source : Crop cutting experiments from West Godavari District, Andhra Pradesh.

TABLE-2

Performance of early and mid-duration varieties in summer crop season in Bihar (Location Patna)

Variety	Grain Yield	Days of 50% flowering
	(kg/ha)	no.
IR-8	4623	120
T(N)1	5726	105
Padma	5452	102

Early dalua in Andhra Pradesh:

Traditionally, the coastal A. P. farmers have been planting rice in February, approximately 3 months after the harvest of the first crop. This practice was evolved over years of experience with local varieties, which are relatively low in tillering and are susceptible to blast disease. Early planting in Rabi (December–January) with these varieties used to suffer due to borers. The farmers have thus learnt to grow Rabi rice between February-May. In such a limited growing season, the yields realised were low due to the obvious choice of a low potential, early maturing, variety as also due to paucity of water and exposure of crop to stem borer attack at flowering stage. With the availability of high yielding varieties which tiller better and insecticides which offer fair protection against stem borers in tillering phase, the early dalua campaign got on to a good start and the farmers now harvest a crop of even a mid-duration variety like Jaya or Sona, prior to the end of March. The area under Rabi rice has increased and the late season stem borer damage minimised. This experience originally gained in West Godavari, has now

been extended to other districts, such that the entire Rabi rice area in the state is programmed for early planting.

Opportunities in other states :

The practice of delaying Rabi rice cultivation upto February is prevalent in Orissa, Karnataka and Tamil Nadu and to some extent, in West Bengal. In all these situations, the possibility does exist to advance the planting of Rabi rice for major gains in rice yields. This message has not gained an impact because of stem borer problem (controlled by simple insecticide sprays) and unimpressive growth in early planted crop. Field experience does cleary show that early boro crops yield more than those planted late. A shift in the growing season would permit larger area to be brought under Rabi rice with the existing irrigation resources. This practice is relevant for West Bengal, Orissa, Tamil Nadu and Karnataka.

The major obstacle to advancing the planting of summer rice in U. P., Bihar, and Assam is the low temperature in the seedbed stage. Protected nurseries with cheap materials like paddy straw covers, waste newspaper, can permit safe growing of nurseries early in February, so that plantings are taken up by the end of February. In situations where this practice could be adapted, the farmers could gain yields by shifting to 120-days duration variety like Ratna. When protected nurseries are not possible, they would be better off by choosing very early maturing varieties like Pusa 2-21, Padma, Cauvery etc. It it profitable to get the crop harvested by mid-July at the latest, instead of August, as is the case now.

Photoperiodic sensitivity for early maturity :

Photosensitive varieties like GEB 24 and Latisail which take 150-170 days to mature in monsoon season, would be extremly early to mature in Rabi season if sown prior to last week of December. This practice exists in Orissa and West Bengal. In fact, the dalua program in Orissa, started in 1951 with the propagation of GEB 24. With the advent of dwarf high yielding varieties, most of which were photoinsensitive, Rabi crop of rice gets over extended in duration in Orissa and West Bengal, where early cool weather retards the growth. Among the dwarf varieties, IET-2254 is weakly photosensitive and for this reason, proves itself extremely useful for early Rabi sowings, particularly in West Bengal and Orissa, A special feature about this variety is its early vigour and quick tillering ability, such that despite shorter duration in Rabi, there is no reduction in tillering and consequently produces good yields. This variety possesses long slender grains. In southern states - Andhra Pradesh, Tamil Nandu and Karnataka - IET-2254 would be earlier to Jaya even in late Rabi season. The duration of this variety in select locations in kharif and Rabi illustrates this point (Table-3). This is a variety of Jaya duratin in kharif, but becomes one of Ratna duration in Rabi due to photosensitivity.

TABLE-3

Duration of IET-2254 in Kharif and Rabi seasons in different location

Location	Kharif		Rabi		Remarks
	Date sown	Days to flower (no)	Date sown	Days to flower (no)	
Bankura West Bengal	June 28	103	Jan. 6	111	Late Rabi sowings delays duration
Cuttack Orissa	June 8	111	Dec. 12	92	Nearly 3-week difference between the seasons
Maruteru Andhra Pradesh	May 25	115	Dec. 8	97	Earlier the sowing in Kharif, later the duration
Coimbatore Tamil Nadu	June 8	104	Jan. 3	92	In southern locations, early maturity even in late Rabi.

Predominant varieties of Rabi season are Jaya, Sona, Ratna, all photoinsensitive. The performance of IET 2254 has been consistently good in both Kharif and Rabi seasons. While Sona performs as well as Jaya in Kharif, it is not as high in yield during Rabi season, when IET 2254 either equals or betters the performance of Jaya (Table 4). In addition, the over riding merits of IET 2254 are the resistance to blast, bacterial leaf blight and brown plant-hoppers. Yet another variety, IET 1444 (a reselection from IET 849 with medium selender grains) is exceptionally resistant to blast, out yields Ratna during Rabi season. The grain types of IET 2254 and Ratna are of course, long slender, while IET 849 is only medium slender. while IET 2254 is an excellent choice for early Rabi planting, IET 1444 would be ideally suited, when the planting is delayed for one or other season. Additional merit of IET 1444 is its early vigour and tolerance to low phosphate soil condition.

Past disease problems:

A Rabi variety should be tolerant to stem borers and brown plant hoppers and resistant to blast disease at seedling stage. Most dwarf varieties, by virtue of their high tillering ability "overpower" a moderate level of infestation of dead hearts. Low-cost plant protection schedule against stem borers is to practice good agronomy (for promotion of good tillering), to take up 1-2 sprays each in the seeded and early planted crop. Chemical control of stem borers at flowering stage (white ears) is relatively more difficult and costly and this is best accomplished by advancing the sowing time, which has other advantages as well.

Blast disease could be a major problem, particularly in early Rabi plantings. It is safe to avoid particularly susceptible varieties. The level of resistance in Sona and IET-2254 may be satisfactory. But, under exceptional disease pressure,

Jaya and IET-1444 would prove advantageous.

Exceptionally, rice tungro virus could be a serious problem in early Rabi sowings (for example, in Telangana region of A. P.) whenever the Rabi crop overlaps with the main season crop, as is likely to happen in early Rabi sowings of West Bengal and Orissa. It is essential to spray the seed beds of early Rabi so as to minimise green leaf hopper feeding.

The problem of brown plant hoppers is becoming increasingly serious. The leaf canopy prevents the insecticides from reaching the stem base which is the site of active feeding. Although the damage is visible after the crop comes to flower, infestation would have occurred far earlier i. e., within 30-40 days after planting. It is a good practice to monitor the build up of brown plant hoppers by walking in the field and disturbing the plants; and practice an insecticide spray directed to the base of the stem when such infestation has been observed. One scrutiny close to maximum tillering stage (50-60 days after planting) is highly recommended. Spraying against brown plant hoppers at this stage in the infested fields can keep under check the build up of the insect and avoid hopper burn.

Judicious use of fertilizers:

When the fertilizers are difficult to get and are costly even when available, it is all the more necessary to grow a dwarf high yielding variety with high yield potential. A variety with higher yield potential indeed needs less not more fertilizer per unit of targetted grain yield. Mid-duration dwarf varieties like Sona, Jaya, Vijaya, IET 2254 and IR 8, become all the more relevant in years of fertilizer crisis, as is now.

Cultural practices which maximise the fertilizer efficiency and the change in the timings of application, have become necessary as a result of shortage of fertilizers. Basal application is a luxury which can be totally skipped. In stead, very close spacing (10 x 10 or 15 x 15 cm) should be adopted with 1–2 seedlings per hill and with robust seedlings originating from a thinly sown seedbed. Plantings should be shallow, no deeper than 5 cm. Maintenance of a thin film of water (not deeper than 5–10 cm and less the better) during tillering phase is important to promote tillering. The merits of late topdressing of N-fertilizers is becoming particularly evident. A single topdressing of N-fertilizer at approximately 40-50 kg N/ha and applied only once

TABLE–4

Mean grain yields (kg/ha) of select dwarf varieties of rice in Kharif and Rabi seasons

	Kharif 1971			Rabi 1972			Kharif 1972		Rabi 1973		Kharif 1973		Resistance to
ariety	SGVT	UVT-1	UVT-2	SGVT	UVT-1	UVT-2	UVT-1	UVT-2	UVT-1	UVT-2	UVT-1	UVT-2	insects & diseases
ET 2254	5561	—	—	6737	—	—	—	5237	—	6385	—	5797	BL, BLB, ,BPH, GLH
atna	—	4988	—	5340	5546	—	4907	—	5424	—	4895	—	RTV
ıya	5649	—	5406	6309	—	6962	—	5339	—	6249	—	5831	BL, GLH
ona	—	—	4948	—	—	6074	—	5064	—	5361	—	5644	RTV, GLH
ET 849	—	4742	—	—	6049	—	4805	—	5786	—	4785	—	BL, GLH

BL=blast; BLB=bacterial leaf blight; BPH=brown plant hopper; GLH=green leaf hopper; RTV=Rice tungro virus

Source : AICRIP Variety trials

at about 30-40 days after planting, gives excellent yield response. The rationale behind this practice is that the closely spaced plants of rice exploit most of the native fertility to the extant growth is permitted, and develop an extensive root system by the time the N-fertilizer is topdressed—a stage which synchronizes with the time the crop is at incipient stage of N-deficiency. The efficiency of such a single topdressing has been amply verified in research plots and farmers' field trials. Data from the farmers' field trials in A. P. are presented in Table 5.

TABLE-5
Grain yields (kg/ha) data from the Management Minikit trials in Andra Pradesh Kharif 1973

		Heavy fertilization			Good cultural practices		
Season/ Variety	No. of trials	Rate of N (kg/ha)	Good cultural practices	Poor cultural practices	Rate of N kg/ha	Late topdressing of N	O-N level
			Grain yield (kg/ha)			Grain yield kg/ha	
Kharif 1973							
Jaya	18	60	5779	5032	30	5293	4906
	14	80	2061	4103	40	4504	3792
Jaya	8	150	5318	4497	50	4118	3663
Sona	9	80	5130	4617	40	4968	4088
Vijaya	6	60	4882	4395	30	4354	3809
Rabi 1974							
Jaya	14	120	5441	4576	60	4664	3418
Sona	13	120	5920	5075	60	5525	4013

It is significant to note that even when no N-fertilizer is applied, the farmers are able to secure over 3-4 tons/ha as long as they adopt good cultural practices. It is likewise, clear that heavy fertilization per se is not only a poor but an expensive substitute for good management practices. Unless the fertilizer is cheaper than the cost of good cultural practices (which is contrary to the fact), the direction for the farmers to take would be to maximize the non-cash inputs in rice farming.

In conclusion, a good Rabi harvest would depend upon the choice of a good high yielding variety, advancing the sowing time, practice of good cultural practices, efficient use of fertilizers and minimal and need-based plant protection.

2. New challenges before the Indian Agriculture

(Prof. V.K.R.V. Rao, M.P. and Director, Institute for social and economic change, Bangalore).

The advent of the new technology with its high yielding and fertiliser responsive varieties in the mid-sixties gave a new glow of optimism to the outlook for Indian agriculture and with the record yield of 95 million tons of foodgrains that the country produced in 1967-68, the Government of India actually brought out a stamp in commemoration of the successful introduction of the green revolution in India. The euphoria continued for a few years, culminating in the next record yield of 108 million tons in 1970-71, the stoppage of imports in 1971, the building up of a substantial volume of a buffer stocks by indigenous procurement and whispered hopes of India soon being able to turn into an exporter of foodgrains. The next year saw a marginal decline in output; but the year that followed, namely 1972-73, was a drought year reviving ancient memories of the fickleness of Indian agriculture, and brought the output of foodgrains down to 95 million tons or the level with which we had begun the era of the green revolution with in 1967-68. The scramble for imports began again and the emphasis turned into disillusion, if not despair, cynical remarks were made about the so-called green revolution and the nation was once again seized of what seemed to be its intractable food problem. But nature smiled again, giving the country a good agricultural year in 1973-74 and official expectations placed output of the food grains at 114 million tons. From later information available about the state of the rabi crop and the possible reduction in moisture for the summer crop, it now appears that the output for 1973-74 would be more in the region of 109 million tons or about the same level as has been reached three years earlier in 1970-71. The increase in output between the first and final years of the Fourth Five Year Plan is thus no more than about 8 to 9 million tons or an average of less than 1.8% a year, while the difference in output between the second year of the Fourth Plan-a good year and the final year of the Fourth Plan-also a good year-is practically nil; and this is in spite of the green revolution which has continued throughout the period with its expansion of the area under H.Y.V. and increase in the volume of fertiliser input.

It is now a well-known fact that the green revolution strategy was mainly concentrated on foodgrains, resulting in what Dr. Dharm Narain has termed "this near-paralysis in this output of cash crops" in his technical address two years ago to the Silver Jubilee Session of the very organisation I am now addressing.

The contrast between the performance of foodgrains (the subject of the green revolution) and that of cash crops (which had not been brought under the green revolution) is clearly revealed when we look at their respective total output during these two five year periods. Relevant figures are given below :

TABLE-1

Commodity	Unit	5 years ending 1964-65	5 years ending 1972-73	% difference of col. 4 from col. 3
Cereals	Million Tonnes	356.8	447.4	+ 25.6
Sugarcane	,,	54.0	63.8	+ 18.1
Oilseeds	,,	37.4	39.2	+ 4.8
Cotton	Million bales of 180 kgs each	26.3	26.0	– 1.1
Jute	,,	28.1	24.1	– 14.2

The green revolution, however, was not directed at commercial crops but on foodgrains ; and its success must be judged by its impact on this part of agricultural output. We may therefore compare the output for the five years of the green revolution (1968–69 to 1972–73) with that of the five years preceding the green revolution (1960–61 to 1964-65) to assess the effect of the new technology on the performance of the cereals to which it has been applied. Relevant figures are given below :

TABLE–2

(Figures in million tonnes)

Crop	1960–61 to 1964-65	1968–69 to 1972–73	Difference between col. 2 & 3	% of the difference to col. 2
Rice	179.8	199.1	+19.3	+ 10.8
Jowar	46.5	41.8	— 4.7	— 10.1
Bajra	19.3	26.3	+ 7.0	+ 36.3
Maize	22.2	30.1	+ 7.9	+ 35.6
Wheat	56.0	114.0	+58.0	+103.6
Total	323.8	411.3	+87.5	+ 27.1

The average annual rate of increase came to 5. 4 percent which is substantially higher than the compound rate of growth of foodgrains as a whole during either of the two decades of the fifties or of the two decades sixties combined. Wheat of course is the dominant partner in this achievement while maize and bajra have done reasonably well as compared to their previous performance. It is rice, the principal cereal in India, which has not shown progress, while jowar has actully recorded a decline in absolute terms. While bajra and maize have shown a high rate of growth during the five year period as a whole as compared to the earlier five year period, the fluctuations in their annual output

seems to have increased during the later period.

The non-HYV foodgrains consists of ragi, barley, minor millets and pulses and accounted for about 17 per cent of the peak output in 1970-71. In their case, output during the green revolution period actually fell by 1.4 million tonnes as compared to their output in the pre-green revolution period-from 91.1 to 90.5 million tonnes-thus indicating the effect of the non-application of the new technology to these crops.

To sum up, there can be no doubt about the effectiveness of the new technology in raising the output of foodgrains, though this was confined only to the HYV cereal and among them mainly to wheat, maize and bajra, while rice output rose less than in the pre-green revolution period and jowar actually declined. While wheat had an unbroken record of a steady rise except for 1972-73, maize and bajra fluctuated substan i .lly up and down even excluding 1972-73 when they fell along with wheat and rice. The obvious explanation for the differing behaviour of the five Cereals was the effectiveness of HYV reinforced by irrigation and controlled water supply in the case of wheat, effectiveness of HYV diluted by the absence of irrigation in the case of maize and bajra, the non-effectiveness of HYV reinforced by lack of control of water supply in spite of irrigation in the case of rice, and the ineffectiveness of HYV reinforced by absence of irrigation in the case of jowar. It must be added that as regards wheat, substantial increase in the area under cultivation was an important cause of its phenomenal growth in output during this period. In the case of non-HYV cereals and pulses, the lack of progress in output, almost approximating to stagnation, was due both to the absence of the new technology and of irrigation in regard to these crops.

The Draft Fifth Plan envisages a target of 4.2 per cent compound growth in foodgrains. The following Table gives the relevant data on the compound growth during the second decade, the Fourth Plan targets and likely achievements and the Fifth Plan target, which will show the magnitude of the task that the Planners have set before Indian agriculture during the Fifth Plan period.

TABLE-3

Compound growth rate (percent)

Crop	1960-61 - 1971-72	IV Plan target	IV Plan achievement	V Plan target
Rice	1.88	5.90	2.10	4.20
Jowar	—0.72	8.50	—0.60	3.00
Bajra	5.39	6.50	11.30	4.20
Maize	3.52	5.20	2.70	4.20
Wheat	8.76	5.90	10.00	4.50
Pulses	—0.48	3.70	2.00	4.00
Total foodgrains *	2.64	5.60	3.10	4.20

* *Likely achievement is 3.1 percent against assumed base level of 1968-69 but is 3.9 percent against actual level in 1968-69. This is on the assumption that output in 1973-74 would be about 114 million tons whereas it is more likely to be 108-110 million tonnes, which would bring down the growth rate achievement.*

A relevant factor in the strategy for increasing agricultural production is the extent to which it is possible to have more than one crop on the same cultivated area. Contrary to popular impression, it is not only irrigated area that is capable of having more than one crop. India has a large area under double cropping which is not irrigated but only rain-fed, and this is in fact, substantially larger than the irrigated area under double cropping. Thus, in 1969-70, the latest year for wichh data is available, the total cultivated area sown more than once was 24.8 million hectares, of which rainfed area sown more than once was as much as 17.9 million hectares or 72.3% of the total double cropped area. Relevant figures are given below :

TABLE–4

Area sown more than once (in 000 hectares)

Year	Irrigated area sown more than once	Rain-fed area sown more than once	Total cultivated area sown more than once	% of col. 3 to col. 4
1950-51	1710	11437	13147	87.1
1955-56	2884	15271	18155	84.1
1960-61	3319	16254	19573	83.0
1965-66	4490	14634	19124	76.4
1967-68	5609	17715	22324	79.4
1969-70	6876	17924	24800	72.3

While the double cropped area under irrigation grew faster than that under rain-fed conditions and occupies an increasing portion of the total double cropped area, the bulk of the irrigated area still continues to be sown with only one crop. The following table gives figures of the gross irrigated area, the net irrigated area, the irrigated area sown more than once and its proportion to the net irrigated area :

TABLE–5

Irrigated area (in 000 hectares)

Year	Gross	Net	Sown more than once	% of double cropped area to net irrigated area
1950-51	22563	20853	1710	8.2
1955-56	25642	22758	2884	12.3
1960-61	27980	24661	3319	13.5
1965-66	31145	26665	4490	16.9
1967-68	33132	27523	5609	20.4
1969-70	37216	30340	6876	22.7

It is also interesting to note that there is a wide variation in the share occupied by irrigated area in the gross area sown more than once, as irrigated area is functionally more suited to multiple cropping than rain-fed areas. Relevant figures are given below :

TABLE-6

Area sown more than once 1967-68 (in 000 acres)

State	Area sown more than once	Irrigated area sown more than once	% of irrigated area sown more than once to total area sown more than once
Punjab	3580	2795	78.0
Tamil Nadu	3029	2093	68.1
Andhra	3526	2182	61.8
Haryana	4043	1601	39.0
Karnataka	1063	339	31.9
Kerala	1554	373	24.0
Union territories	415	74	17.9
Jammu & Kashmir	324	57	17.6
Himachal Pradesh	870	151	17.3
Bihar	6575	1112	16.9
Uttar Pradesh	12953	1717	13.3
Orissa	3600	405	11.3
Gujarat	1527	143	9.4
West Bengal	2679	52	1.9
Madhya Pradesh	4586	47	1.0
Maharashtra	2298	13	0.5
Rajasthan	3855	5	0.1
Assam	1270	Nil	Nil
All India	57634	13860	24.0

While irrigated area is functionally more suited to double cropping and irrigated area sown more than once is a higher porportion of net irrigated area than that of rain-fed area sown more than once to total rain-fed area, it is surprising that it is so low and also how widely it varies between the irrigated area in the different States of the country. Relevant figures are given below:

TABLE-7

Irrigated area sown more than once (in 000 hectares)

State	Net irrigated area	Irrigated area sown more than once	% of irrigated area sown more than once to net irrigated area
Punjab	2333	1131	48.5
Tamil Nadu	2629	847	32.3
Andhra	3089	883	28.6
Haryana	1132	648	57.2
Karnataka	1082	137	12.6
Kerala	411	161	39.2
Union territories	140	30	21.4
Jammu & Kashmir	278	23	8.3
Himachal Pradesh	90	61	67.7
Bihar	2011	450	22.4
Orissa	977	164	16.8
U.P.	5657	695	12.2
Gujarat	1108	58	5.3
West Bengal	1476	21	1.4
Madhya Pradesh	1143	19	1.7
Maharashtra	1476	5	0.4
Rajasthan	1865	276	14.8
All India	27523	5609	20.4

Functional efficiency for sowing more than once on the same unit of land is determined partly by the extent of which the area sown more than once is irrigated and partly by the extent to which the irrigated area is sown more than once. The following table presents this combination for the different states of the Union.

TABLE-8

Area sown more than once

State	Area sown more than once (000 acres)	Percentage of area sown more than once to net cropped area	Percentage of irrigated area sown more than once to total area sown more than once	Percentage of irrigated area sown more than once to net irrigated area
Punjab	3580	26.6	78.0	48.5
Tamil Nadu	3029	16.8	69.1	32.3
Andhra Pradesh	3526	11.2	61.8	28.6
Haryana	4043	31.8	39.0	57.2
Karnataka	1063	4.1	31.9	12.6
Kerala	1554	22.8	24.0	39.2
Union territories	415	19.4	17.9	21.4
Jammu & Kashmir	324	16.2	17.6	8.3
Himachal Pradesh	870	39.2	17.3	67.7
Bihar	6576	24.4	16.9	22.4
Uttar Pradesh	12953	23.1	13:3	12.2
Orissa	3600	19.6	11.3	16.8
Gujarat	1527	5.9	9.4	5.3
West Bengal	2679	16.3	1.9	1.4
Madhya Pradesh	4586	9.4	1.0	1.7
Maharashtra	2298	4.8	0.5	0.4
Rajasthan	3855	9.4	0.1	14.8
Assam	1270	17.7	Nil	Nil
All India	57634	14.3	24.0	20.4

The data given in Table 8 for 1967–68 (the latest year for which this data is available) and since then there has been a big expansion of irrigation and especially in terms of tubewells and energised minor irrigation with obvious consequences in enlarging the irrigated area under more than one crop and of irrigated area under more than one crop to the total sown area under more than one crop. With all that, Table – 8 still presents a basic picture of the functional aspect of multi-cropping in Indian agriculture. While the All-India percentage of irrigated area sown more than once to the total area sown more than once is 24, only 5 States have a larger proportion of irrigated area under more than one crop, namely Punjab, Andhra Pradesh,

Tamil Nadu, Haryana and Karnataka but the total area sown more than once covered by them is only 15.2 m acres, of which irrigated area accounts for about 60%. As against this, the five States of West Bengal, Maharashtra, Madhya Pradesh, Assam and Rajasthan have a negligible portion of irrigated area under the area sown more than once, even though they account for a total area sown more than once, of 14.7 m acres. Taking the country as a whole, 76% of area under more than one crop is without irrigation and therefore subject to climatic hazards, while the greater tragedy is that only 20.4% of the irrigated area bears more than one crop, thus indicating that the vast bulk of irrigation in the country is either for the purpose of giving security to only one crop or that agronomic practices in the irrigated area have not sufficiently developed to go in for more than one crop. The truth probably consists of a mixture of both these explanations.

Since irrigation by itself does not secure the best results from the new technology unless it is accompanied by water control and scientific water management and as water control is easier with tubewells and wells worked by energised pump-sets, it would be relevant to look at the progress of irrigation by sources. Relevant figures are given below:

TABLE-9

Net irrigated area by sources (000 hectares)

	1950–51	1969–70	Difference
Government canals	7158	11272	+4124
Private canals	1137	984	— 153
Tanks	3613	4448	+ 853
Wells	5978	10446	+4468
Others	2967	2490	— 477
Total	20853	30340	+9487

To the extent that energised minor irrigation with its controlled water supply makes for more agricultural efficiency, it is only about one third of the irrigated area that can claim this distinction.

It is clear from what has been said above that the existing state of irrigation in the country is in drastic need of overhauling with a view to increasing the efficiency of its utilisation and giving the country not only a higher yield per acre of the irrigated crop but also of producing a much higher yield of grain output per hectare by promoting the sowing of two and more crops on the irrigated hectare. More attention also needs to be given to the problem of maximizing output from the double crops sown on rain-fed land, which occupies such a large proportion of the area sown more than once in the country. Apart from better maintenance which is required for both major and minor irriagation works, the major defect in some of our irrigation system is the non-availability of assured and regular water supplies to meet the changed requirements of present-day agriculture. Some of the other pro-

blems connected with improving the efficiency of our irrigation system are the construction of water courses and field channels, land levelling, land shaping and other on farm development works, construction of proper drainage systems that will prevent water logging, salinity and alkalinity drastically modifying the current practice of doing field to field agriculture and adopting the restering system of irrigation.

Then of course there is the possibility of extending the area under irrigation. We have in fact been concentrating on this since the advent of planning and it has certainly helped in the increase which has taken place in our agricultural production. And there is still a long way to go before we fully realise the irrigation potential of the country. On present estimates, 107 million hectares of land can be ultimately irrigated both from surface and ground water sources, their contributions being 72 and 35 million hectares respectively. So far we have developed irrigation potential for 44.7 million hectares of which 28.7 million is from surface water and 16 million from ground water. The potential utilised, however is only 42.9 million hectares. During the Fifth Plan, it is intended to add 12.2 million hectares to the irrigation potential of which 7.7 million will be from surface water and 4.5 million from ground water. That would still leave the country with a potential of about 50 million hectares for the sixth and subsequent plan periods. The estimated cost of exploiting this potential at Rs. 4,000 per hectare at current prices would work out at Rs. 20,000 crores; and the Irrigation Commission has concluded that it would be possible to get this done in about 30 years or before the end of this century. The question needs to be considered however whether it would not be possible to shorten this period in view of the imperative need for stepping up the rate of agricultural growth (of both foodgrains and cash crops) within a much shorter period of time than we have envisaged so far. The investment needed is well within our resources especially if we are prepared to take the necessary hard decisions and change priorities in our investment and current outlays and control our non-developmental expenditure. The question that really needs examination is from the point of view of technical feasibility, obtaining the construction material and equipment needed and the volume of energy required to lift the ground water and the skilled man-power needed to undertake and complete the programme within a defined short period.

Yet another factor which needs mentioning before we deal with the policy measures needed to meet the challenges to our agriculture, is the one which is most occupying the public minds in India today and that is the impact of the energy crisis. The energy crisis should not be treated as having only a short period character. In the short period it means paying much higher prices for the energy components that we have to import for producing our fertiliser supplies and for operating the traction requirements of our agriculture (I am leaving out of this discussion the impact of the crisis on our non-agicultural requirements and on the creature comforts of our elitist classes). It also involves scrambling for supplies in a seller's market, where

some of the buyers have not only much larger resources than we have but also are prepared to use them solely for this purpose, as it involves not only their industrial future but also protecting even their existing production and standard of living. The crisis however has a long term aspect which we should not forget. Non-reproducible energy supplies based on crude oil and gas which have a limited life mean that sooner or later we would have to face the same crisis we are facing today and that too from a more vulnerable position as by that time we would have given more hostages to fortune by increasing our dependence on this convenient but disappearing source of energy and fertiliser output. The onset of the energy crisis should certainly lead to a new look being given to our strategy for increasing our agricultural production in so far as is based on a massive increase in fertiliser inputs and a significant increase in mechanisation in our farming operations.

We can now proceed to the principle theme of the address, namely, new challenges to Indian agriculture. Perhaps the use of the phrase 'new' is not quite appropriate. Many of the challenges faced by our agriculture are not new; but to the extent they are old, they have acquired a new intensity because of the growth of our population, the increase in demand following our economic development however inadequate its growth rate, the revolution of rising expectations, the helpless resort we have started to make of deficit financing with its spiralling increase in money demand for goods and services and finally the new programme we have undertaken of 'garibi hatao' that has taken a firm hold on the imagination and emotional fervour of the common man in India. And then of course there is the new fact of the energy crisis in both its short period aspect of balance of payments, procurements of supplies and erosion of self reliance and in its long term aspect of building our agricultural castles on sand and on foreign and insecure sand at that. While there can be no two opinions on the need for bringing down the rate of our population growth and planners are perhaps justified in projecting a halving of this growth rate in about two decades, this is not going to afford any immediate relief to the urgency of bringing about a substantial increase in the growth rate of agricultural production in India in the immediate present and during the short period. In fact, the more quickly we are able to do this, the better will be our ability to bring about a reduction in the birth rate by playing upon it the historically well-proved motivation of a decent standard of living. In my view, we need a growth rate of 4 % in our foodgrains and of 6 % in our cash crops for the remaining years of this century if we are to solve the economic and political problem that has now begun to threaten our social stability and pose law and order problems such as we have not faced for many decades in our country. This is the new challenge that confronts Indian agriculture today. What can we do to meet it?

(To be continued)

V GLEANINGS FROM OTHER JOURNALS

1. Maximising pulse production in the Rabi Season

There is clearly an urgent need to increase the production of pulses in the country. Bengal gram is the major rabi pulse in terms of area and production as well as in terms of potentiality for increasing the productivity. Investigations carried out under the All India Co-ordinated Research Project for the improvement of pulses has clearly shown that given the appropriate agronomy and plant protection the average per ha. yield can be greatly increased.

Sowing the crop at optimum time and with adequate moisture conditions appears to be a very important component of the management. The seed needs to be placed a little deep, about 10 cm; this can be done easily with the help of a seed drill. It is essential that the seed should be placed in adequately moist zone. Such deep placement appears to lead to less moisture stress (wilt) in the latter parts of the life cycle by forcing the roots into the deeper soil layers.

Phosphatic fertilization appears to be a key element in increasing gram production depending on the P_2O_5 availability status of the soil response can be obtained upto 60 kg P_2O_5 ha. In most areas good response can be obtained to 40 kg P_2O_5/ha. An easy way of supplying this requirement would be to use 1 q. of DAP/ha which would not only supply the P_2O_5 required but would also take care of the nitrogen requirements of the plants till the nodules become established and functional. Being granular, DAP is easy to apply. The fertiliser should be placed a few cm. below the seed which can be conveniently done by using a seed drill. Alternatively, the fertiliser can be placed by hand in the furrow, and the seed placed in another furrow opened by the side. Tests under the Co-ordinated Project have shown that the phosphate could also be applied in a split dose, 1/2 at sowing and 1/2 as a foliar spray at flowering. For the foliar application a suspension of single superphosphate could be used. The advantage would be that this will be applied only where the condition of the crop warrants it and the crop is in a position to benefit from such application.

One of the most important prerequisites of good productivity is an optimum plant stand. This can be achieved by using a somewhat higher seed rate than usual. The seed rate to be used would depend on such factors as seed size, fertility of soil, availability of moisture, period of growth etc. but the range seems to be between 75–100 kg. per ha, the higher seed rate being used in the more southern parts where the crop makes less vegetative growth. Treatment with the fungicide PCNB could help to ensure better germination and

stand. Especially where sowing has been delayed, a higher seed rate could be advantageous. With late sowing addition of FYM at the rate of 10 t. per ha is helpful.

Irrigation is an input which is generally not applied to the gram crop. However, results of experiments carried out under the project have revealed that fairly good yields could be obtained. The optimum would appear to be two irrigations, one about 7 weeks after sowing and the other after 10-11 weeks. The latter generally coincides with the initiation of pod formation while the former is just before flower initiation. The first irrigation can be avoided if adequate winter rains are received or the soil is heavy and retains the moisture received in the kharif. In the absence of winter rains this irrigation could be very beneficial not only to the yield of the crop but in reducing the effect of severe frosts which can often occur under such conditions.

Eleminating weed competition leads to substantial increase in yield. A hand weeding after 40–45 days of sowing has been shown to increase yield. The use of weedicides to control weed growth in first few weeks of plant growth could be profitable. Among the easily available weedicides Lasso and TOK E 25 at the rate of 1.25 kg. a. i./ha applied as a pre-emergence application gives satisfactory control at a cost of around Rs. 70/– per ha. Care is, however, necessary to see that the application of the herbicide is not delayed very much after planting. The weedicide application should be done within 24 hours of planting. Otherwise, the gram plants will show toxicity symptoms.

The importance of plant protection measures in realising the yield potential built up with these inputs can hardly need stressing.

The most serious insect pest which causes considerable damage in many parts of the country is the gram pod borer (Heliothis armigera). This pest can, however, be effectively controlled with the use of insecticides. In particular, spraying with 0.07% (EC) Endosulfan has proved very satisfactory. Recent experiments have suggested that 4% Endosulfan dust (20–25 kg. per ha.) could also be effective and would be preferable where scarcity of water makes spray application difficult. An important point to be emphasised is that insecticidal application must be properly timed if it is to be beneficial. The best time in areas where this pest is common would be at the initiation of the first pods. If necessary, a second treatment may have to be given after 3 weeks.

In order to reduce damage from storage pests, particularly bruchids, it is essential to dry the seeds to as low a moisture content (preferably around 9%) as possible. With this and normal prophylactic and hygienic seed storage measures, the infestation should be well controlled. Ethylene dibromide and carbon tetrachloride mixture or phostoxin tablets can be used to fumigate infected material.

Provision of the entire package of practices mentioned above will give the best results. But in case of monetary or other constraints the order of priority for these inputs will be (1) Irrigation, (2) Plant Protection, (3) Phosphorus fertilization and (4) Weeding.

There is also some scope for bringing additional area under rabi pulses by adopting the practice of intercropping long duration, line sown crops such as sugarcane with pulse crops. Studies at Pantnagar has shown that lentil can be taken as an intercrop in autumn planted sugarcane without in any way interfering with sugarcane production. Adoption of such a practice can add appreciably to our pulse production. §

Source: I.C.A.R., New Delhi

2 Role of extension workers in developing agriculture

The future of our nation depends on our efficiency in farming. Productivity of our land has to be substantially increased to sustain the dependant man and animal. To support the increasing populations of man and animal each unit of land has to continuously produce more quantities of food grains, fruits, vegetables, oilseeds, fibre crops, spices and condiments, fodder and feed and several other raw materials for agro based industries. Presently our national economy is under severe constraints because of low average productivity of our farm lands. For attaining self-sufficiency in food grain production we are sowing about 72% of our arable land to cereals and utilize about 80% of irrigation water to cultivate these crops. Inspite of such a biased effort we are not producing the required quantities of food grains. As a result we are not able to grow more of commercial crops to improve our economy. Also, the required quantities of nutritive food material such as fruits and vegetables, meat, egg, etc., are not being produced for want of land, price incentive and other essential inputs. Therefore, our people are under-nourished and their work efficiency is low. Because of their low work efficiency their contribution to national economy is poor.

Immense possibilities :

One redeeming feature is that during the past ten years our agricultural scientists have made very significant progress in their research works. Their achievements are very many which are comparable with those of any other group of scientists working elsewhere in the world. The results of their research work, when tested and adopted in some farmers' fields, have yielded rich dividends. Yield of wheat grains from one hectare of land in India can be as high as 15 tonnes as against the present national average of about two tonnes ; the yield of rice can be 14 tonnes per hectare as against national average of 1.6 tonnes ; similarly the yields of every crop can be about 6 to 10 times the present average. It has also been demonstrated that the milk yield of a dairy animal can be substantially increased from the present average of about 1.5 litres per day and less than 300 litres per lactation to about 10 litres per day. The Champion cow Karanswiss has yielded above 40 litres per day and about 6,000 litres per lactation. The yield of poultry eggs can be as high as 280 per annum per bird. We have new breeds of poultry birds which are very efficient in converting the feed into meet or egg ; 3.5 kg. of feed can be converted into 1 kg. meat and 1 kg. of feed into about 10 eggs. Likewise we have breeds of pigs which can convert about 2.5 kg. of feed concentrates into 1 kg. of meat, and at the same time proliferate rapidly in their numbers. Thus our technology has developed very rapidly and what was considered impossible or as scientific curios and rarities a few years ago have today become cherished realities. More recently, many progressive farmers have been adopting these latest techniques and some of them have got recognition and distinction as Krishi

Pandits, for their achievements. All the same there exists a wide gap between what is possible and what is obtaining in the average farm lands of our country. Added to this, there is a wide gap between different agroclimatic regions of the country, between irrigated and rainfed farming and between different farmers who are neighbours in the same village. In a country wedded to socialistic pattern of society we should strive our best to minimise these differences.

Willing farmers:

While our scientists are eminent, our farmers are equally efficient and hard working. In the past, Indian farmers used to be blamed for their conservatism and tradition-bound attitudes in adopting new farm practices. During the past ten years there has been a dramatic change in their attitude towards adopting newer technology, and this was readily reflected when the new high-yielding varieties of wheat, rice, jowar, bajra and maize were introduced in the country, which ushered in the green revolution. Today our farmers are ready to grow any new variety and adopt any new technique, provided they are assured of a substantial increase in the yields and substantial increases are certainly possible. All the same our progress in scientific farming is far short of our requirement. Unfortunately, when the farmers are more inclined towards scientific farming, the nation is faced with shortages of fertilisers, pesticides and quality seeds which are the major inputs in agriculture. We have there fore to learn the ways and means of more economically and efficiently using these inputs which are in short supply. How are we to substantially increase the competence of our farmers in scientific farming under the existing and future constraints? This is possible only through improving the efficiency of our extension agencies. We need to strengthen the infrastructure and reorganise the administrative framework of the extension agencies. Our agricultural extension workers are blamed and accused of being inefficient and incompetent, but when we take a close look at our technocrats in agriculture we will realise that they are helpless.

Inadequate extension :

There are about 60,000 professional agricultural graduates in the country, of whom about 10,000 are post-graduate degree holders who are mostly engaged in research work and another 10,000 graduates are employed in private sector undertakings or self employed. The remaining about 40,000 agricultural graduates are employed in extension work in the country of whom about 25,000 to 30,000 are actual field workers and the rest either supervisors or administrative heads. These 25,000 agricultural graduates are supported in their extension work by about 50,000 village level workers. Most of these extension workers are generalists and a few are specialists in some areas like plant protection. Their main work is to disseminate the latest scientific knowledge in different branches of agriculture and help to improve the efficiency of farmers in the country.

We cultivate about 135 m. hectares of land of which about 60 m. hectares are irrigated. About 79 m. persons own

this land most of them are owner cultivators. A large number of the farmers work as wage earners on these farms. Our agricultural graduates and Village Level Workers are expected to maintain contacts with mostly the owner-cultivators. On an average one agricultural graduate has to cover about 3,000 farmers, and a village level worker about 1,500 farmers, and these farmers are distributed in many villages in widely spread out areas. Each agricultural graduate has to cover about 3,000 to 10,000 hectares of cultivated land in carrying out his extension work. In most other countries there are five to ten times more extension workers for the same number of farmers. In these scientifically advanced and advancing countries most of the farmers are educated and therefore it is relatively easier to communicate and transmit the latest findings in agriculture to them. In India about 80% of the farmers are illiterate and therefore we need many more extension workers than at present to communicate with them. This is one of the main reasons for the relative low efficiency of our extension agency.

New knowledge:

As pointed out earlier, scientific advancements in agriculture are taking place very rapidly. An agricultural graduate who had passed out ten years back, had not studied anything about high yielding crop varieties, while in college. Since he passed out of the college several new findings have been reported and there is explosion of scientific knowledge in the field. Once employed each agricultural graduate continues in extension work for at least three decades. To be effective in his work he has to be in touch with the latest developments in agriculture covering every branch of agriculture. This is not only impossible, but even if he wishes to do so, he has no facilities and opportunities to update his knowledge. This is also true in the case of village level workers whose technical competence is much lower when compared with his counterparts in advanced countries. Therefore frequent in service training of our graduates and village level workers should be given to make them continuously effective. In the coming years we have to employ agricultural graduates as village level workers, so as to upgrade the quality of extension work. We have to also progressively deploy more specialists for extension work, since generalists cannot become effective in tackling difficult field problems and in breaking new ground. Farming practices are becoming increasingly specific for locations and crops and several new and complicated problems arise in the field from time to time causing much concern to the farmers. To identify and solve such problems we need specialists among our extension workers. Only then we will be able to make more rapid progress in scientific farming.

The agricultural graduates employed for extension work are presently loaded with administrative work and they find little time to move to villages and meet farmers. Their desk work should be minimised through procedural reforms in administration. They should also be made more mobile by providing motor cycles and jeeps and this will enable them to have more contacts with the farmers. In order to keep them active we have to improve their service conditions and provide better promo-

tional opportunities and other incentives. All these measures would lead to improving the competency of our farming community in adopting newer scientific practices. Our future depends on how efficiently we transfer the technical know how from the research laboratory and greenhouse to the farmers' fields and for this purpose we have to reform and strengthen the extension agencies in the country. Top most priority should be given to such an action programme during the Fifth Five Year Plan period.

Source: Kurukshetra, November 1, 1974
G. Rangaswami, Vice Chancellor, Tamil Nadu Agriculture University, Coimbatore

3 Potash has no influence on soil pH

The main factor in soil acidification is leaching.

Soil acidification has come into question in recent years. There has been no shortage of speakers on this subject, both qualified and un-qualified, and the opinion that the unrestricted use of fertilizers is a factor in causing acidification has been freely voiced even though this view has no foundation in fact.

The most important natural factor in causing acidity is leaching through which, according to rainfall and soil type, upto 500 kgs Cao/hectare can be lost annually. If this loss cannot be replaced from geological source in the soil the latter must be regularly limed in order to keep the pH up to a favourable level.

Certain fertilizers such as, for example, ammonium sulphate and urea among others do contribute to soil acidity while using others can greatly reduce the annual lime requirement–calcium ammonium nitrate and basic slag are of this type.

Sulphate or muriate of potash, the almost universally used potassic fertilizers, are neutral salts which neither acidify soils nor have the reverse effect. Neither plants nor micro-organisms alter chemically either the potassium or chloride (in muriate of potash) and so the pH of the soil cannot be altered as is the case with ammonium salts (eg. sulphate of ammonia). In the case of sulphate of potash, and also magnesium sulphate, the sulphate portion is modified (reduced) in plant metabolism and from this basic OH-ions are produced. The total quantity is however is so small that the pH of the soil is not measurably affected.

The absence of any effect of the intensity of K–Manuring on pH is a by–product result from many experiments on potash fertilization. The results of an exact pot experiment on lucerne carried out.in the open are summarized in the table. We see that the pH of the soil is unaffected by the heavy potash dressings given which had very large effects in increasing plant available potassium and the conclusoin can justly be drawn that potash fertilizers do not affect the pH of thesoil.

Treatment	K_O		K_1		K_2		K_D*		
Dressing (K_2O)	g/pot	kg/ha	g/pot	kg/ha	g/pot	kg/ha	g/pot	kg/ha	Fertiliser
Late summer 1967	0	0	2.5	2575	5.0	5150	4.5	4655	KCl
Summer 1968	0	0	2.0	2080	4.0	4160	4.0	4160	KCl
Summer 1969	0	0	12.5	13000	25.0	26000	22.5	23400	KCl
Spring 1970	0	0	12.5	13000	25.0	26000	22.5	23400	KCl
Summer 1970	0	0	12.5	13000	25.0	26000	22.5	23400	K_2SO_4
Total	0	0	42.0	43655	84.0	87310	76.0	79015	

Soil conditions after this fertilisation:				
Plant available K ($mg/K_2O/100$ g soil)	6.0	50.4	84.0	69.6
pH	7.0	7.0	7.0	6.9

* K_D=Deep application (at 37.5 cm. depth)

Source : International Fertilizer correspondent, Vol. XV No, 4/1974.

4. Plant nutrient consumption per unit area in India

The consumption of plant nutrients per hectare has increased progressively and has more than doubled in the last 6 years, from 6.7 to 14.9 kg/ha. However, the growth rate had been very erratic, not following any definite trend. Nor has it kept pace with the estimates. As against the estimated consumption of 17.6 kgs/ha of $N + P_2O_5 + K_2O$ in 1972–73, the actual consumption is much lower (14.9 kg/ha) and is only 0.4 kg./ha more than the preceding year. This has happened primarily due to the acute shortfall in availability both from domestic sources and from imports during the year under review. The monsoon also played the truant in many parts of the country resulting in a severe drought in States like Rajasthan, Gujarat, Maharashtra and Andhra Pradesh. This depressed considerably the consumption of fertilisers in the country.

In general, there has been considerable increase in per hectare consumption of plant nutrients over the consumption rate since the mid-sixties. The agricultural development programme launched during the early and mid-sixties (IADP, IAAP, HYVP etc.) appear to have been the main contributory factors for this increase. This is very apparent in IADP districts and in the States having large areas under HYVs. A massive promotional programme undertaken by the Government agencies and the fertiliser manufacturers, and the easier availaility of fertilizers in almost every corner of the country through the domestic sources and Pool distribution are the primary contributing factors for the increase in consumption of plant nutrients per unit area.

It is estimated that the consumption of plant nutrients will increase by 28% in 1973–74 over the year under review.

Despite this increase, India ranks perhaps the lowest in consumption of plant nutrients per unit area, as compared to the agriculturally developed countries of the world, and so is our productivity per unit of area of land. To meet our growing agriculture needs. we have to raise our agriculture productivity involving greater use of plant nutrients. The rate of consumption in other countries is a measure of the leeway that we have yet to make.

Source : Internationl Fertilizer Correspondent, Vol. XV No. 4/1974

VI Research News

1 It is possible to mobilise 50–100 kg of nitrogen per ha through inoculation of wild and cultivated legumes.

One of the well known methods of addition of nitrogen to soil/plant system is through green manuring. The reported work on green-manuring of cereal crops indicates that the response to green-manuring was of a low order not exceeding 20% over the ungreen-manured crop. The work done at the Central Rice Research Institute, Cuttack indicates that in situ green-manuring of rice crop with two species of Sesbania and green-manuring with material from different species of Crotalaria brought from outside resulted in addition of only 20 lb N/acre. These studies however have been carried out without inoculation of the green-manure crop with specific strains of rhizobia of known efficiency probably on the assumption that natural nodulation by native rhizobia and nitrogen fixation would be adequate. But it is well recognised that Indian soils have been under cultivation of a wide variety of leguminous crops since long and hence, generally ineffective strains of rhizobia with high saprophytic competence would be quite widespread in these soils.

It was therefore decided to make a cursory study on nitrogen contribution of few wild and cultivated legumes inoculated with cowpea strains of rhizobia of known efficiency of fixation.

The legume seeds were inoculated with a mixture of six different cowpea type rhizobial strains and planted in cement cisterns of 1.5 sq.ft. area and one feet deep containing washed sand. Four replicates of each legume were used. At periodical intervals of one and a half month, the tops were cut down to a height of 3". Ten such cuttings spread over one and half year were obtained. At each cutting the dry matter and nitrogen yields from the tops were determined. The results on dry matter and total nitrogen yields obtained per year per ha are presented in Table–I. Per hectare yield is calculated on the assumption that one plant would occupy not more than 1.5 ft. area if kept under check by periodical cutting. The two species of Mimosa are annuals or semi-perennials and other legumes are perennials.

All the legumes were profusely nodulated. Very extensive nodulation was found on Mimosa invisa and Calopogonium mucunoides, a thornless variety of mimosa which puts out extensive vegetative growth. Least nodulation was with M. Pudica, a wild legume with thorns. The total amount of nitrogen recovered in the tops ranged from 35 kg N/ha year with pudica and 110 kg N/ha M. year with M. invisa and Calopogonium mucunoides. Glycine javanica and Centrosema pubescens fixed 90 and 55 kg. N/ha/year respectively.

Since the plants were grown in washed sand, contribution of soil nitrogen to the growth of the plant was considered negligible. Although the experiments were of a cursory nature with no rigid controls included, the data indicated the probable quantities of nitrogen that can accrue to the soil/plant system through symbiotic fixation of nitrogen by well nodulated crop of legume.

TABLE-I
Nitrogen and Dry Matter yields of some Wild and Cultivated Legumes (in kg/ha/year)

Name of the legume	Dry matter produced	Nitrogen (N) yield
1. Mimosa pudica	5874	35
2. Mimosa invisa	12945	110
3. Glycine javanica	15378	90
4. Galopogonium mucunoides	10901	110
5. Centrosema pubescens	8809	55

2. Some new rice cultures in field trial :

In rice, varietal improvement is a continuous process to evolve and or to identify genotypes for specific demands apart from high yields. In recent years, rice breeding is concentrated on three aspects viz., to obtain varieties with yield level of Jaya or better and grain quality similar to that of GEB-24, varieties resistant to pests and diseases, varieties suitable for environmental stress condition like soil and climate. The present article is a report on some of the new rice cultures on hand that would fulfil one or more of the above requirement and found suitable for trials on farmers fields.

The new rice cultures, except Intan, have a plant type similar to Jaya, insensitive to day length, non-lodging and fertiliser responsive. The AICRIP and the State multiplication trials have shown that a majority of these cultures have an yield potential comparable to Jaya. The special merits of the new rice cultures are briefly described below :

IET–2254 (RP 4-14) :

This culture originates from a cross T 90 x IR 8 and is developed at AICRIP, Hyderabad. As for yield performance, IET–2254 is similar or slightly superior to Jaya. It matures in 145 to 150 days at Mandya. The grain characteristics are comparable to those of Sona (IET 1991). This culture is under the State minikit trials since 1974.

IET-2295 (CR-12 128) :

This culture was derived from the cross IR 8 x CR 1014 at CRRI, Cuttack. In AICRIP and the State trials, IET 2295 has shown an yield potential similar to Jaya. It matures in 140 to 145 days at Mandya. Grain characteristics are comparable to IET 2254. This culture is being evaluated in the minikit trials, since 1972. The performance is encouraging.

GMR–2 (RPW 6–13) :

This culture obtained from the cross

IR 8 x Saim 29 was developed at AICRIP, Hyderabad. In yield performance GMR 2 is superior to Jaya when grown as a first crop in the gall midge endemic coastal parts, during kharif. GMR 2 reaches maturity in 130 to 135 days in the coastal areas. It has coarse (bold) grains. In the farmers field trial, GMR 2 has been found suitable for plantings in the Bailu (low lands) and Majalu (mid lands) lands of the coastal districts. GMR 2 is the first AICRIP variety to be highly resistant to gall midge.

GMR 17 (W13249) :

This culture was introduced through AICRIP, in 1971 for the gall midge affected areas of coastal tracts. GMR 17 is a dwarf culture which combines yield with resistance to gall midge. It matures in 115 to 125 days. It is well suited to the Bettu (uplands) lands of coastal tracts. As for yield potential, GMR 17 is much better than the local varieties (MTU 3 and PTB 10). Grain characteristics are similar to those of GMR 2, and has a local preference. This culture is under trial in farmers field since 1972, and is gaining importance.

Intan :

Intan is an introduction from Indonesiai. This culture is found resistant to blast as evidenced by the blast screening tests carried out at ARS, Ponnampet, since 1969. In yield tests, Intan has been found superior to the local varieties (KB 356, MB 319, BKB, etc,) of Coorg district. It matures in 165 to 170 days. Intan has medium slender/fine grains and the rice cooks sticky. The rice is especially good for parboiling. This culture is sensitive to day length and not fit for summer cultivation. This culture is gaining importance as a blast resistant variety.

MR-81 :

This culture was identified from the cross IR.8 x Zenith in a blast screening programme conducted at ARS, Ponnampet, in 1969. It is a dwarf culture with an yield performance nearer to Jaya. The grain characteristics are comparable to those of Sona. MR.81 equals Jaya in days to maturity. In the tests at ARS, Ponnampet MR 81 has been found to be resistant to blast. Its ability to resist blast has confirmed in trials on farmers field (at Mudigere and Thirthahalli). This culture is gaining importance especially in the blast endemic areas of Malnad.

MR 272 :

This culture originates from the cross Jaya x S 317 (Halubbalu) and was identified at MRS, Hebbal, in 1972. S 317 is a traditional cold tolerant variety of Karnataka. Special merits of MR 272 are its early maturity tolerance and to cold injury (in the nursery and at tillering). MR 272 is earlier than Madhu by 8 to 10 days. As for yield, MR 272 is slightly inferior to Madhu. This culture may be recommended for summer plantings in Malnad. It can be harvested well in time before the onset of early monsoon.

Source: Current Research, October 15, 1974, University of Agricultural Sciences, Bangalore-560024

VII News in brief

1 Groundnuts : ICRISAT's New Research Crop.

International Crops Research Institute for the Semi-Arid Tropics, Hyderabad has added a crop which-kilo for kilo-has more calories than sugar; more fat than heavy cream; and more protein, minerals and vitamins than beef liver.

With 25% protein, groundnut are definitely an important food crop of the semi-arid tropics.

After soyabean and cottonseeds, groundnuts are the world's most important source of edible oil-a commodity now in short supply. About two thirds of the world's groundnut oil comes from 30 countries in the semi-arid tropics.

Protein suppliments, forage, paper, margarine, soap and chemicals are important groundnut by products. In crop rotation, the legumes provides nitrogen to nutrient starved tropical soils.

The total impact of groundnuts on people's diet is difficult to estimate. With the annual world trade in ground nuts valued at U.S. 481 million dollars, exports out of the semi-arid regions are large.

However, even after sizable export' enough production remains in India and Nigeria, for example, to give every man, woman and child 4 to 7 grams of protein per day-roughly 10% of their daily requirement. For Senegal and other countries the consumption is even higher.

In spite of its importance, yields of groundnuts in most of the semi-arid tropics are low. While Israel, Japan and Turkey produce about 2,200 kg/ha, the average yield in the semi-arid tropics is only 835 kg/ha.

The extensive. co-ordinated and continous research required to rectify this situation can only be provided by an international world center, according to the feasibility experts.

2. Yardsticks :

1. For calculating the additional agricultural production the following yard sticks may be adopted :

1. Major and Medium Irrigation	1/6 ton/acre for 70% area.
2. Minor Irrigation	1/5 ton/acre for 70% area.
3. Soil Conservation	1/20 ton per acre for 60% area.
4. Land Reclamation & Development	1/4 ton per acre.
5. Improved Seeds	Paddy 1/20 ton per acre Other millets 1/50 ton per acre.
6. Fertilisers	Nitrogenous 2/3 for food crops at 10 tons per ton of N phosphatic - 3/4 for food crops at 6 tons per ton of P_2O_5.

7. Local Manurial Resources :
   a) Urban compost — 1/30 ton for 60% area.
   b) Rural compost — 1/40 ton for 60% area.
8. Green manuring — 1/10 ton per acre

2. The total production of any particular crop grown in the district may be calculated taking into account, the total acreage under the crop and average yield of the particular crop during the particular year. For this purpose the following formula may be adopted.

$$\text{Production} = \text{Area x Average yield}$$

$$\therefore \text{Production in tons} = \frac{\text{Area in ha. x Average yield/ha. in kgs}}{1000}$$

3. The anticipated area and production of any particular crop in the district may be worked out taking into consideration, the normal area under the particular crop and the (normal) average yield. The information regarding the (Normal) area and (Normal) average yield are readily available in the Office of the District Statistical Officer. However, while working out the total production of the district, the District Statistical Officer of the concerned district may be consulted without fail.

Deputy Director of Agriculture (Statistics), H. O.

3. Fish manure :

Fish manure processed by drying non-edible fish or wastes from fish industry is a well recognised, balanced organic manure containing both nitrogen and phosphoric acid. Nitrogen is present mainly as protein and phosphoric acid as calcium phosphate, both become readily available on decomposition in the soil. Fish is generally dried before it is sold as manure though occasionally fresh fish is also used for manuring crops wherever locally available. Fish is some time mixed with common salt before it is dried. The product so obtained contains varying quantities of sodium chloride. Some fish are rich in oil which is often removed and the residue (known as fish guano) sold as manure. If the fish contains more than 5% oil it decomposes more slowly.

Fish meal is also prepared in India by cooking in steam digesters and then drying. The manure however has an extremely offensive smell which stands in the way of its wider use. It has been found that the objectionable smell can be completely smothered by the use of two litres of pine oil emulsion per tonne. The long coast line of the country offers a great scope for fuller exploitation of this highly valuable manure for increasing agricultural production.

India's resources of fish meal are quite enormous. It is possible to produce about 40,000 tonnes of fish meal annually. In the present context of shortage of chemical fertilisers fish meal provides an effective substitute which could be harnessed easily. Several types of fish are sold as manure. Their manurial value is highly variable. The nitrogen content varies from 4 to over 10% and phosphoric acid from 3–9%. The potash content is very low, less than 1 percent. Its C–N ratio varies between 4 and 5.

The use of fish as manure is restricted mainly to coastal area on account of the high cost of transport to inland.

It can be applied to all crops and has been found very valuable for Rice, Ragi, Coconut and many types of Vegetables and Fruit trees.

It is usually powdered before use, though sometimes the whole fish or small pieces are pushed in the soil while transplanting.

Fish manure is sometimes adulterated with spurious material such as sand, sawdust and other inert materials which reduce its manurial value. It is therefore essential to ascertain its quality before application as otherwise the desired results may not beobtained and the investment will go waste without any benefit to the crop. The amount of common salt if in excess will sometimes be harmful for the physical properties of soil. Hence caution has to be used against high sodium chloride mixed with fish manure.

Deputy Director of Agriculture (Soil Chemistry), H. O.

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4. Laboratory activities :
Soil Testing :

As against the total target to analyse 4,30,000 soil samples in the State, the 19 functioning Soil Testing Units have analysed a little over 1,40,000 soil samples upto end of October, as indicated below :

Soil Testing Unit	Programme (1974-75)	Achievement
1. Bangalore	30,000	13,068
2. Davangere (Chitradurga dist.)	30,000	11,476
3. Dhadesugur (Raichur dist.)	30,000	5,250
4. Jamkhandi (Bijapur dist.)	30,000	7,941
5. Mangalore	30,000	10,723
6. Mandya	30,000	9,458
7. Mobile Unit (State) Mysore	10,000	5,296
8. Shimoga	30,000	8,869
9. Gulbarga	30,000	11,476
10. Mysore	20,000	6,913
11. Kudige (Coorg dist.)	10,000	3,589
12. Bellary	30,000	7,581
13. Hassan	20,000	7,627
14. Gokak (Belgaum district)	20,000	11,111
15. Chickmagalur	10,000	7,304
16. Dharwar	20,000	7,008
17. Tumkur	20,000	9,300
18. Kolar	20,000	3,441
19. Mobile Unit (Central)	10,000	3,183

The proposed unit at Bhalki in Bidar district is likely to start functioning shortly.

5. Analysis Of Fertilizers Samples :

The Central Laboratory at Bangalore has analysed 302 fertiliser samples out of 316 samples received upto end of October 1974 as listed below. Many districts have not been sending the samples. About 52 samples were considered to be sub-standard.

	No. of samples received	No. of samples analysed
1. Bangalore	17	17
2. Belgaum	21	15
3. Bellary	3	3
4. Bidar	—	—
5. Bijapur	6	6
6. Chickmagalur	43	35
7. Chitradurga	76	16
8. Coorg	—	—
9. Dharwar	76	16
10. Gulbarga	2	2
11. Hassan	28	28
12. Kolar	5	5
13. Mandya	40	40
14. Mysore	2	2
15. North Kanara	—	—
16. Raichur	2	2
17. Shimoga	43	43
18. South Kanara	11	11
19. Tumkur	1	1
Total	316	302

6. Efficient Use of Nitro Phosphate (ANP) :

Agronomists have suggested that nitro phosphate should not be used in wet land paddy as 50% of the nitrogen content which is in the form of nitrates, is leached out and lost because of denitrification. As such if nitro phosphate is used in wet land paddy, it is likely that an appreciable quantity of nitrogen is lost. It has also been suggested that nitro phosphate which has low solubility of P_2O_5 should not ordinarily be used in alkaline and neutral soils. This fertiliser is good for acid soils and in long duration crops.

7. High Yielding Varieties During Kharif 1974 :

As against the target of 3 lakh hectares under paddy, 2.17 lakh hectares have been covered accounting for a coverage of 72% as against the target. The coverage under hybrid maize is 92,844 hectares as against the target of 1 lakh hectares. The percentage of coverage works out to 93.

Under Hybrid Jowar and Hybrid Bajra, the respective coverage are 3,43,678 hects. and 73,903 hects. as against the targets of 4 lakh and 0.80 lakh hectares respectively. The percentage of coverage works out to 85 in the case of Hybrid Jowar and 92 in the case of Hybrid Bajra. The overall achievement of the total kharif target of 8,80,000 hects., is 7,27,467 which works out to 80% of the target.

As regards performance of various districts, it is seen that Shimoga district which has taken a target of 40,000 hects. under paddy, tops the other districts with a performance of 37,829 hects. although percentagewise it falls below certain other districts which have taken lower targets. The other note worthy performance under paddy is seen in the case of Chitradurga (20324 hects), Tumkur (16,380 hects), South Kanara (22,441 hects) and Raichur (18,465 hects). The lowest achievement, percentagewise, is seen in the case of Mandya district, where it is only 22. The delayed release of

of irrigation water is the chief reason for this shortfall.

In the case of hybrid jowar, Dharwar district with a coverage of over 1 lakh hects. tops the other districts, followed by Bellary district with a coverage of 67,192 hectares Chitradurga, stands third in the line with a coverage of 46,000 hectares.

Belgaum, Bangalore, Mysore and Kolar, lead the other districts in the case of Hybrid Maize, accounting for a coverage of 19,000 hects., 13,500 hects., 12,700 hects. and 12,300 hects. respectively.

Gulbarga, Bellary and Raichur, in order, have done the maximum coverage under Hybrid Bajra, with a respective coverage of 23,000 hects. 17,600 hects. and 17,000 hects.

8. Separate Seed Certification Agency:

The State has issued formal orders on 16–11–74 establishing a separate seed certification agency for the State taking over this responsibility from the National Seeds Corporation. This agency will ensure better quality seeds as it will be an atonomous body, indepedent of production and trade.

Director's Tour

The Director of Agriculture was in Mandya on 11-11-74 and attended the field day at the V. C. Farm. He visited the plots of Indo-African varieties of ragi at Mukyenahalli, ROH–2 ragi plots and double cropped plots at Tubugere and attended field day on dryland ragi at Mojarahosahalli on 17-11-74.

Schemes :

The following schemes were sanctioned as detailed below :

1. Intensive Agricultural Area programme, vide G.O. No. AF. 125. AML. 74 dated 29-11-74.
2. Organisation of National Demonstration on major food crops vide G.O. No. AF.112.AML.74 dated 22-11-74.
3. Pilot Project on Multiple Cropping, vide G.O. No. AF.158 AML. 73 dated 4-11-74.
4. Development of Tobacco, vide G.O. No. AF.148 AML.74 dated 8-11-74.
5. Seed Testing Laboratory for agricultural crops, vide G.O. No. AF.94.AML.74 dated 11-11-74.
6. Seed certification agency vide G.O. No. AF.186.AUM.72. dated 16.11.1974.

Promotions and transfers : Nil.

Publications, extension materials and radio talks :

Fortnightly seasonal tips for the benefit of farmers in the State for the month of November were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and Publicity and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'.

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